COMMISSION OF THE EUROPEAN COMMUNITIES

EVOLUTION OF CONCENTRATION IN THE UNITED KINGDOM CEMENT INDUSTRY: STRUCTURE, CONDUCT AND PERFORMANCE

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EVOLUTION OF CONCENTRATION IN THE UNITED KINGDOM CEMENT INDUSTRY: STRUCTURE, CONDUCT AND PERFORMANCE

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of the Commission of the European Communities,
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PREFACE

The present volume is part of a series of sectoral studies on the evolution of concentration in the member states of the European Community.

These reports were compiled by the different national Institutes and experts, engaged by the Commission to effect the study programme in question.

Regarding the specific and general interest of these reports and the responsibility taken by the Commission with regard to the European Parliament, they are published wholly in the original version.

The Commission refrains from commenting, only stating that the responsibility for the data and opinions appearing in the reports, rests solely with the Institute or the expert who is the author.

Other reports on the sectoral programme will be published by the Commission as soon as they are received.

The Commission will also publish a series of documents and tables of syntheses, allowing for international comparisons on the evolution of concentration in the different member states of the Community.

ACKNOWLEDGEMENTS

The statistical analysis of concentration in the UK cement industry presented in this book is based upon the exceptionally accurate information, derived on a consistent basis for use in the fixing of common minimum prices within the Federation. Published material in company accounts is an inadequate source of information for this industry and we are immensely indebted to the Cement Makers' Federation for making confidential data available and in particular to its Director, Rear Admiral C.K.T. Wheen, C.B., who also has commented helpfully upon the work.

We are grateful to the senior management of The Associated Portland Cement Company (now Blue Circle Industries), The Ribblesdale Cement Company, The Aberthaw and Bristol Channel Portland Cement Company, The Rugby Portland Cement Company and Tunnel Cement Ltd., who gave willingly of their time to assist us in our investigation.

We are indebted also to Dr. R. Linda for his interest and enthusiasm in the course of the study, and for his helpful criticisms.

We express our thanks to Mrs C.P. Garner, who worked quickly and efficiently in typing the final Report.

Charles K. Rowley

George K. Yarrow

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Chapter 1 INTRODUCTION

This study of the United Kingdom cement industry was sponsored by the Commission of the European Communities as part of a wider series of such industrial studies throughout the E.E.C. A central objective of this series is to provide a detailed statistical analysis of changes in the concentration of industries selected for investigation, applying a standard methodological framework specified by the Commission. In addition, each study addresses itself to questions concerning the extent to which firms are connected by interlocking shareholdings and interlocking directorates, the concentration of share ownership and the significance of company directors' interests in the capital of their own firms. Furthermore, each study investigates such practices or agreements as are likely to prove detrimental to competition within the industry under investigation.

For the most part, the studies are based upon statistical information extracted from company reports and, as such, are exposed to all the inconsistencies and limitations that such reports contain. In our case, however, statistical information available to the 'independent costs committee of the Cement Makers' Federation for purposes of fixing common prices was made available to us on a strictly confidential basis. In consequence, the concentration analysis throughout Chapter 5 is based on cement-specific information provided on an entirely consistent basis. For this reason, our results are exceptionally accurate and our general conclusions are drawn with an unusual degree of confidence.

As a consequence of our investigation, we concluded that significant connections existed between certain of the six cement producers in the United Kingdom in the form both of interlocking shareholdings and of interlocking directorates. For this reason the measures of concentration were calculated on three separate bases, each reflecting a different view of the structure of

the U.K. cement industry. We concluded that the weight of evidence supported the view that there was a small trend decline in concentration over the period 1968-1977, although this was more marked in the case of concentration measures which gave strong weighting to market share increases by relatively small producers. In no case was a trend increase in concentration apparent, although there was a marked pro-cyclical tendency for concentration to increase in the boom and to decline in the recession. The situation is obscured somewhat by the existence of a common price agreement within the industry operated by the Cement Makers' Federation. This price agreement has been endorsed twice by the Restrictive Practices Court and does not provide high profits to its members. In our view the structure and the conduct of the UK cement industry does not distort the movement of cement between the United Kingdom and other E.E.C. countries. The low level of international trade in cement products is explained in terms of high transport costs and high dock charges in the U.K.

Chapter 2 THE NATURE AND EXTENT OF PRODUCTION

1. The Composition of Portland Cement

Although mineral cements of one kind and another have been manufactured for utilisation in the building processes since early historical times, Portland cement is a relatively modern material. The first reference to 'Portland cement' occurs in the patent granted to Joseph Aspdin, a builder of Leeds, in 1824 for a cement produced by firing a mixture of limestone and clay. Aspdin's product was not the Portland cement currently manufactured, but rather an improved hydraulic lime cement, not unlike that described by the Roman writer, Vitruvius. Indeed, it was not until 1845 that the first true Portland cement in the modern sense was produced in Kent by firing a mixture of chalk and clay to a temperature sufficiently high as to complete the chemical and physical reactions which occur in the manufacture of modern cement.

Hydraulic cements, of which Portland cement is by far the most important, are so-named because of their ability to set and develop strength under water. They are mineral substances which, in fine powder form, react with water, evolving heat and forming a strong, dense mass of very low solubility. The principal hydraulic compounds present in Portland cement are tricalcium silicate (50-70 per cent), dicalcium silicate (20-30 per cent), tricalcium aluminate (5-12 per cent) and calcium aluminoferrite (5-12 per cent). As indicated, the proportion of each of these compounds present in the finished cement depends both on the raw materials utilised and on the production process employed. Variations in proportion affect the properties of the cement and controlled variations are exploited to produce different types of Portland cement.

These hydraulic compounds of calcium are formed, in the process of Portland cement manufacture, by the reactions between oxides of calcium,

silicon, aluminium and iron present in the raw mix as they are brought to increasingly higher temperatures in the cement kiln. Table 1 outlines the common raw materials used in Britain and the typical raw material mix used in manufacture:

Table 1 Analyses of Typical Raw Materials

	Chalk	Clay	Limestone	Shale	Marl	Typical raw mix
Silica	1.14	60.48	2.16	55.67	16.86	14.50
Alumina	0.28	17.79	1.09	21.50	3.38	3.03
Iron Oxide	0.14	6.77	0.54	9.00	1.11	1.31
Calcium Oxide	54.68	1.61	52.72	0.89	42.58	44.38
Magnesium Oxide	0.48	3.10	0.68	2.81	0.62	0.59
Sulphur	0.01	nil	0.03	0.30	nil	nil
Sulphur Trioxide	0.07	0.21	0.02	nil	0.08	0.07
Loss on Ignition	43.04	6.65	42.39	4.65	34.66	35.86
Potassium Oxide	0.04	2.61	0.26	4.56	0.66	0.52
Sodium Oxide	0.09	0.74	0.11	0.82	0.12	0.13
	99.97	99.96	100.0	100.20	100.07	99.99

(Source: 'Portland Cement in the Making' published by Cement and Concrete Association, 1978)

In the majority of cases, the required proportions of oxides in the raw mix are obtained by blending calcareous materials such as chalk or limestone with argillaceous materials such as clay or shale. In some cases, however, the essential oxides occur approximately in the desired proportions and require only a minimum of blending.

2. Types of Portland Cement

The main types of Portland cement manufactured in the United Kingdom are (a) ordinary, (b) rapid-hardening, (c) sulphate-resisting, (d) white, (e) masonry and (f) blast furnace.

(a) Ordinary Portland cement is the most widely used of all cements, and accounts approximately for 85 per cent of total United Kingdom cement production. It has a medium rate of heat evolution and strength development.

(b) Rapid-hardening Portland Cement is similar in chemical composition to ordinary Portland cement but differs physically in being more finely ground during manufacture. Although it is not 'quick-setting' the greater specific surface provided by the finer particle size increases the rate of early hydration, giving higher early strengths which are important in concrete work which calls for the early removal of formwork or rapid turn around of precast concrete units in a mould.

(c) Sulphate-resisting Portland cement is manufactured especially for use in concretes which may be subject to the effects of sulphates in solution. Such sulphates attack the hydration product of tricalcium aluminate which is therefore restricted in this process to not more than 3.5 per cent. This limitation is imposed by decreasing the alumina in the feed material and by adding extra iron oxide to the raw mix.

(d) White Portland cement is used for visual effect in white or coloured concretes which are to be left exposed, and also in white or coloured mortars for masonry and rendering. It has the same properties as ordinary Portland cement but is manufactured from special raw materials which substantially are free from colour-forming compounds such as the iron oxides which give other cements their characteristic grey or grey-brown colour. The materials used in Britain are pure chalk and white china clay.

(e) Masonry cement is produced from ordinary Portland cement clinker with additives incorporated during grinding. These additives increase the cohesiveness of the mixed mortar, increase water retention and limit the development of strength in the mix. Masonry cement is not suitable for making concrete.

(f) Portland-blastfurnace cement is manufactured only in small quantities in Britain. However, it represents a significant part of the outputs of the cement industries of some countries. It is made by inter-grinding ordinary Portland cement clinker with selected granulated blast-furnace slag. The slag shows little hydraulic activity of its own, but reacts with the alkaline products of the hydration of the Portland cement.

3. Cement Manufacturing Processes

Although variations of detail, which may be considerable, exist from plant to plant, all methods of cement manufacture are designed to produce the same end product and all involve the same fundamental stages.

Firstly, the raw materials are reduced to fine particle size so that they can be mixed. Secondly, the raw materials are blended and mixed to produce a raw feed mix of uniform chemical composition. Depending on the process used, the blending and mixing may take place partly during the milling stage, or may be a completely separate operation. Thirdly, the blended raw mix is heated to the point where all moisture is driven off as steam or water vapour. Fourthly, the dried mix is heated to decarbonation or calcining temperature of approximately 800^{o}C. At this temperature, the calcium carbonate in the mix is dissociated into calcium oxide (free lime), which remains in the mix, and carbon dioxide which is driven off as gas. Fifthly, the mix is further heated and as the temperature rises the oxides of calcium, silicon, aluminium and iron react to form the calcium silicates, aluminate and aluminoferrite which are the principal active compounds of Portland cement. This process is completed at a temperature

of around 1400°C. The resulting product is Portland cement clinker. Sixthly, the clinker is cooled to a temperature at which it can be handled conveniently, 60 - 150°C. Clinker may be despatched directly to the finish grinding mills; but usually it is stockpiled. Since clinker may be stored for relatively long periods without deterioration it is possible to supply cement to locations far-distant from the works by shipping clinker rather than finished cement. Seventhly, clinker is ground to the specified fineness with the addition of a small proportion of gypsum to control the setting time of the finished cement. Additives for the special cements are incorporated during the grinding stage. Finally, the finished cement is stored in silos for a relatively short time before being despatched to the customer in bags or in bulk. Bulk delivery, using specially designed dry-bulk carriers, accounts for some 75 per cent of all cement sold in the United Kingdom.

Manufacturing methods can be divided into two broad categories, the wet and dry processes, which differ in the way materials are dealt with until stage 4, the calcining stage. In the wet process, the raw materials are reduced to the requisite fineness in water and are blended, stored and fed to the kiln as fluid slurry. Water in the slurry - approximately 30-40 per cent by weight - is eliminated in the initial stage of kiln processing. In the dry process, moisture in the raw materials is eliminated in part by heating in the initial processing stage, usually in the case of hard materials, during the grinding stage itself. This relatively dry 'meal' is blended and usually is passed through a preheater system which completes the drying and (in the case of complete preheater installations) raises the meal to a temperature at which it is partially calcined.

The two major variants of the wet and dry processes are the semi-wet and semi-dry methods. In both, the raw feed, prepared either by the wet or by the dry methods, according to the nature of the raw materials, is

formed into pellets or nodules with a medium moisture content. The pellets or nodules are fed into the kiln by means of a grate preheater, in which the moving bed of nodulised material is dried and brought up to calcining temperature by heat from the kiln.

The choice of process is dependent upon a combination of factors, including the nature of the raw materials, the thermal efficiency of the different processes and energy prices. Following the quadrupling of oil prices in 1973-74, the relatively fuel-intensive wet process, once widely used, where the raw materials were chalk and clay, is largely being superceded by the dry or semi-dry processes wherever the raw materials are suitable (ideally limestone and shale). Energy prices are also generating more active consideration of the semi-wet process, which is still only in limited use throughout the world. In 1977, the wet process accounted for 67 per cent of kiln capacity in the U.K., the dry process for 18 per cent and the semi-dry for 15 per cent.

In all processes, kilns are operated continuously, 24 hours a day, 7 days a week, apart from shutdowns for relining with heat-resisting refractory bricks or other necessary repairs. Grinding mills are operated to meet current orders.

4. Transport and Distribution

The distribution of cement to customers is a major operation, involving the large-scale utilisation both of labour and of capital. In 1945, all but a small percentage of the industry's output was sold in bags, with much of it delivered by rail to rail-served builders' merchants yards, whence it was finally distributed to the user for site mixing. At the present time, however, some 87 per cent of UK production, although still invoiced through merchants, goes direct from the manufacturer to the customer, with only 13 per cent passing through merchants' yards. Bagged cement

accounts for only just over 25 per cent of the total, whilst the remainder is delivered in bulk to the customers' own silos.

Another significant change has been the relative decline in site mixing in the more densely populated areas. Only about one-third of all cement now reaches the construction site as cement itself; the large majority arrives in the form of ready-mixed concrete or manufactured concrete products. The ready-mixed concrete industry is the cement industry's largest single market, taking over 40 per cent of production, whilst manufacturers of precast concrete and asbestos cement products take a further 25 per cent. Both industries receive virtually all their cement in bulk. In 1976, 40.7 per cent of all U.K. cement was delivered to ready-mixed concrete manufacturers, 22.1 per cent to precast concrete manufacturers, 2.1 per cent to asbestos cement manufacturers, 13.6 per cent to merchants' yards and 21.5 per cent to sites, etc.

Cement may be delivered direct from the works to the customer; but a considerable proportion is routed through manufacturers' regional distribution depots from which local deliveries are made. Deliveries to customers almost invariably are by road, but despatches from works to depots may be by road or by rail. In 1977, approximately 84 per cent were by rail. Water transport (by barge or coastwise shipping in bulk and in bags) accounts for 6 per cent of all works-to-depot despatches. Virtually all bulk cement is now delivered in purpose-made pressurised tank vehicles using air discharge. Bagged cement is delivered by standard platform lorries. In general, the cement manufacturers maintain a sufficient fleet of bulk vehicles to meet peak demands, whereas fleets of lorries for bagged cement are normally only large enough to accommodate average demand, with lorries and drivers hired additionally from independent hauliers to meet peak demand.

5. Cement and Energy

The manufacture of cement is necessarily energy-intensive, in that the chemical and physical reactions involved in the production of cement clinker take place at high temperatures. The greatest use of primary energy occurs in the manufacture of clinker in the cement kiln and major efforts have been made (even prior to 1973/74) to economise in this input. Between 1965 and 1975, the average energy consumption from fuel in British kilns fell by 23 per cent from 7.2 to 5.5 giga Joules (GJ) per tonne of clinker.

The process used has an important bearing on the amount of energy required. In particular, the wet process is much the most fuel-intensive, since even in the most modern wet-process kilns, water evaporation accounts for 40 per cent or more of the total heat consumption. Thus, in 1975, the average energy consumption from fuel in British wet-process kilns was 6.60 GJ/t, compared with 3.66 GJ/t for dry process kilns, and 3.42 GJ/t for the semi-dry process.

Inevitably, there is a world-wide shift towards the use of dry or semi-dry processes wherever raw materials allow, and to the semi-wet process elsewhere. In addition, there have been continuing improvements in kiln design and in associated equipment which also have increased the energy efficiency of kiln systems. Notable among these have been improvements in the design of the chain system in the drying zone of wet-process kilns, the adoption of suspension preheaters for dry-process kilns, improvements in clinker cooler design, and the use of waste heat from the cooler for recycling purposes.

Approximately 84 per cent of existing kiln capacity is coal-fired, approximately 11 per cent is gas-fired from the national grid and approximately 5 per cent is oil-fired. Since 1973/74, a number of kilns previously fired by oil have been converted to gas firing. Considerable attention has

been devoted in recent years to the use of low-grade fuels in cement manufacture and, following preliminary trials, pulverized domestic refuse is now used to supplement pulverized coal fuel in certain cement works.

The firing of raw materials into clinker in the kilns accounts for just under 90 per cent of the net energy used in cement manufacture. In addition, the industry consumes substantial amounts of secondary energy in the form of electricity, especially in the milling of raw materials and of cement clinker. To economise in electricity costs, grinding mills, wherever feasible, are used during periods of off-peak electricity demand.

6. Cement Production in the United Kingdom

There are seven manufacturers of Portland cement in the United Kingdom:

The Associated Portland Cement Manufacturers Ltd (APCM)

The Rugby Portland Cement Company Ltd (Rugby)

Tunnel Holdings Ltd (Tunnel)

Ribblesdale Cement Ltd (Ribblesdale)

Aberthaw and Bristol Channel Portland Cement Company Ltd (Aberthaw)

The Ketton Portland Cement Company Ltd (Ketton)

Imperial Chemical Industries Ltd (ICI)

APCM own 26 per cent of Aberthaw. Ribblesdale is owned 50 per cent by Tunnel and 50 per cent by Ketton. Thos. H. Ward Ltd. owns 29.9 per cent of Tunnel and 100 per cent of Ketton. Thus, it also has a majority interest in Ribblesdale. The first six companies listed above manufacture and market Portland cement and are members of the Cement Makers' Federation (CMF). ICI markets its cement through APCM and is not a member of the CMF. Currently, it is the smallest manufacturer and produces cement in order to render profitable its use of limestone slurry which is a residue from that used in some of its other production processes.

The number of cement producing works in the U.K. has fallen from 51 in 1968 to 31 in 1978. APCM reduced its number of cement works over this period from 33 to 16, Tunnel from 5 to 3, and ICI from 2 to 1. One of Tunnel's works does not manufacture clinker, but only grinds clinker into cement. The other manufacturers each have the same number of cement works at present as they had 10 years ago. Rugby has 7, Aberthaw 2, and Ribblesdale and Ketton one each.

The annual production capacity of the UK industry currently is estimated at some 20 million tonnes of cement clinker. Table 2 outlines the rated production capacity of each manufacturer.

Table 2 The Productive Capacity of UK Cement Manufacturers Jan. 1978

Manufacturer	Million Tonnes	Per cent
APCM	12.5	62
Rugby	3.1	15.5
Tunnel	1.5	7.5
Ribblesdale	1.1	5.5
Aberthaw	1.0	5
Ketton	0.7	3.5
ICI	0.2	1
	20.1	100

(Source: Price Commission 'The Associated Portland Cement Manufacturers Ltd. - Increases in Cement Prices' HMSO 495 12th June 1978)

The rate of capacity utilisation varies quite markedly through the cycle of the construction industry. For example, in 1973 - the peak year for cement demand in the UK - the throughput actually exceeded rated capacity. Since then, capacity utilisation declined to a low of 75 per cent

in 1976 and rose to 80 per cent in 1977 only as a consequence of works closures. Table 3 outlines UK manufacturers' deliveries of all cement to the U.K. market over the decade 1968-1977:

Table 3 UK Manufacturers' Deliveries of Cement to UK Market 1968-77

Year	Millions of Tonnes	Annual Change %
1968	17.6	+2
1969	17.4	-1
1970	17.1	-2
1971	17.8	+4
1972	18.0	+1
1973	19.9	+11
1974	17.5	-12
1975	16.8	-4
1976	15.5	-8
1977	14.3	-8

(Source: Price Commission op.cit.)

Table 4 analyses U.K. deliveries of cement for the three years 1975 to 1977 by market segment:

Table 4 UK Deliveries of Cement by Market Segment 1975-77

Market	1975	1976	1977
	Millions of Tonnes		
Readymix concrete	7.1	6.3	6.1
Concrete products	3.3	3.4	3.1
Building sites	3.9	3.4	2.6
Merchants' yards and stockists	2.2	2.1	2.2
Asbestos cement products	0.3	0.3	0.3
	16.8	15.5	14.3

(Source: Price Commission op.cit)

There is very little trade between the UK and other countries in cement, largely as a consequence of relatively high transport costs. UK exports of cement and clinker were static between 1974 and 1976 at some one million tonnes each year. In 1977 they rose to 1.75 million tonnes. APCM accounted for over 90 per cent of UK exports of cement and clinker during 1976 and 1977. In 1975, its share was 70 per cent. In 1977, APCM gained The Queen's Award for Export Achievement. Throughout the last five years, there have been no imports of clinker into the UK. Cement imports, all into Northern Ireland from the Irish Republic, declined from 100,000 tonnes in 1973 to 10,000 tonnes in 1977.

The Location of Plants

In 1977, Portland cement was produced by 31 works in the U.K., 30 of which were fully integrated plants producing finished cement from locally obtained raw materials. The one remaining works (as outlined above) was restricted to clinker grinding only. The majority of these works are located in England. There are two works in South Wales, one works in North Wales, one integrated works and one clinker grinding works in Scotland and two works in Northern Ireland. Figure 1 outlines the location of cement works in the United Kingdom 1977, and separates out the works of the largest cement manufacturer, APCM.

Because of the very high capital costs involved in the construction or expansion of a cement works, and the high costs of transporting raw materials, it is important that the works should have raw material resources which will be economically workable over long periods of time. This is a major factor both in establishing new works and in planning the future development of existing works. Throughout the history of cement manufacture, plants have been closed down because of the exhaustion, or limited future, of their raw material resources.

In consequence, the market penetration of the largest cement manufacturer, APCM, varies markedly across the country. In 1977, it served 100 per cent of the market in the North of Scotland and Northern Ireland and over 90 per cent in the West Country. Yet, in parts of South Wales and Northamptonshire, it controlled less than one-fifth of the market. Figure 1 indicates the importance of plant location as a basis of APCM's varying market penetration.

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Chapter 3 COST AND OUTPUT

It is important to distinguish clearly between cost of production in the short-run, when cement makers are unable to vary the input of certain factors such as capital and, increasingly in the United Kingdom, labour, and cost of production in the long run when all factor inputs may be varied in response to changing market pressures. Both concepts are important to an understanding of the UK cement industry and its arrangements.

1. Short-run costs

In this study, we have made no attempt to estimate short-run cost-output functions, either by means of statistical cost analysis or by means of engineering simulations. Rather, we have attempted to isolate the changing composition of average total costs of cement in the United Kingdom over the period 1966 to 1977, using available information, provided by the independent costs committee of the Cement Makers' Federation, in response to the requests of various government price control agencies.

In 1966, the average manufacturing cost per ton of UK cement was 75/9d, with the following composition as outlined in Table 5:

Table 5 Average UK Cement Manufacturing Costs per Ton 1966

Input	% of Av.Manufg.Cost per ton
Kiln Fuel	27
Electric Power	12
Wages and Salaries	17
Maintenance Materials	13
Works Overheads	9
Depreciation	8
Other Costs	14
	100

(Source: National Board for Prices and Incomes Report No.38: Portland Cement Prices Aug. 1967 at p.7)

It is evident from Table 5 that fuel and power costs accounted at that time for almost 40 per cent of total manufacturing costs. Table 6 outlines the composition of average total costs per ton of cement which in 1966 amounted to 110/10d per ton.

Table 6 Average Total Costs per ton of UK cement 1966

Input	% of average total cost per ton
Manufacturing	68
Delivery expenses	18
Sales expenses and containers	7
Merchants' margins and discounts	7
	100

(Source: Ibid at p.7)

A subsequent report of the National Board for Prices and Incomes, published in November 1969, provided a more detailed analysis of average short-run cement costs and offered a comparison between the composition of such costs in 1966 and in 1969. Table 7 outlines the situation thus depicted.

Perhaps the most significant change between 1966 and 1969, as outlined in Table 7 is the fall in the preparation of kiln fuel costs to total costs of cement production from 18.3 to 16.7 per cent. This was achieved, despite rises in fuel prices over the period, by cement makers changing the quality and type of fuel utilised, notably a shift from oil to coal, and by significant reductions in fuel consumption per ton of cement produced.

Table 7 Average Cost of UK Cement per Ton 1966-69

Component	Year to 31-12-66	Six months to 30-6-69
	%	%
Raw materials (including clinker purchased)	5.2	5.6
Wages	11.7	12.0
Maintenance materials	8.6	8.9
Kiln Fuel	18.3	16.7
Electric power	7.9	8.2
Works overheads	6.1	6.6
General administration	3.8	4.1
Depreciation	5.4	5.8
Others	1.4	1.3
Manufacturing cost	68.4	69.2
Delivery expenses	18.3	18.1
Sales expenses and containers	7.2	6.8
Merchants' margins and discounts	6.1	5.9
TOTAL COST	100	100

(Source: These proporties were calculated from National Board for Prices and Incomes: Report No.133 'Portland Cement Prices' Nov 1969 at Table D and p.9)

In 1978, the Price Commission provided detailed information on the short-run costs of the largest cement maker in the United Kingdom, APCM, with indications of changes in the company's cost profile which had occurred between 1973 and 1977. Table 8 outlines in detail the changes in the composition of costs for that period. The distinction between variable and fixed costs adopted by the Commission is retained for exposition

purposes but we would stress that the division, especially with regard to manpower and to repair stores, is arbitrary.

Table 8 Total Unit Costs of APCM (1973 and 1978)

Unit Costs	1973 %	1977 %	Per cent Increase in Unit Costs 1977:1973
Production Variable:			
Kiln fuel	19	26	232
Electric power	9	10	193
Other	4	4	129
	32	40	208
Fixed:			
Manpower	14	10	68
Repair stores (maintenance parts)	11	10	127
Process stores	4	3	112
Overheads	16	14	112
	45	37	102
Total Production Costs	77	77	146
Distribution	23	23	145
Total Unit Costs	100	100	146

(Source: The Price Commission supra at p.28)

As is evident from Table 8 both production and distribution costs rose to the same extent over the period 1973 to 1977. However, unit variable production costs (as defined by the Commission) were three times greater, whilst unit fixed costs (similarly defined) had only doubled. This differential almost wholly was explained by the proportionately higher escalation in kiln fuel and electric power costs over this period. Indeed,

in 1977, energy in terms of kiln fuel and electricity was the largest cost item in cement production, accounting for nearly 50 per cent of total production costs, with labour and maintenance costs of less significance than had been the case in 1973.

As we indicated in Chapter 2, energy utilisation now is central to the economics of cement making, and indeed is especially sensitive to the process utilised. Table 9 which outlines information provided by APCM to The Price Commission, indicates the advantages in terms of cost per ton of cement of using the dry or the semi-dry process rather than the wet process in cement production.

Table 9 Cost per ton in Cement Production by Process (Wet Process = 100)

	Dry Process	Semi-Dry Process	Wet Process
Kiln fuel	22		
Electric Power	15		
Sub total fuel	37	38	52
Manpower	12	12	8
Repair stores (maintenance parts)	12	12	16
Overheads	16	19	14
Other costs	3	7	10
TOTAL	80	88	100

(Source: APCM The Price Commission supra p.29)

In 1977, an average wet process works required 22 tonnes of standard coal for each 100 tonnes of clinker produced, whereas the average dry process works required only 12 tonnes. Clearly, rising energy costs have

widened the total production cost differential between dry and semi-dry process works and wet process works, from 15 per cent in 1973 to 22 per cent in 1977.

In such circumstances, UK cement makers have intensified their efforts to achieve fuel economies, available without major capital expanditure. For example, APCM during the past few years has carried out a programme involving the reduction of slurry water content, the reduction of kiln back-end temperatures, the operation of kilns as close to capacity as possible, the improvement of wet kiln chain systems, the improvement of heat transfer from the clinker coolers, and the reduction of grinding energy requirements and grinding media costs. Between 1969 and 1977, APCM reduced its energy requirements per tonne of cement by 17 per cent from 69 therms to 57 therms per tonne, whilst other UK cement makers reduced their energy requirements from 70 to 64 therms per ton. Since 1972, APCM has used approximately 15 per cent less energy per tonne than the other UK cement makers. Nevertheless, as Table 8 indicates, kiln fuel costs have still risen relative to other costs between 1973 and 1977.

As is evident from Table 8, since 1973 distribution costs per tonne have increased at the same rate as production costs. In part, this increase is explained by the decline in the level of deliveries to the UK market. In part, it is a consequence of cement makers, individually anxious to maintain market share, incurring distributional costs by satisfying customers' demands for delivery from specific plants or at particular times of day for no additional charge. The Price Commission incorrectly referred to such activities as "distribution inefficiencies". In reality, of course, they are an inevitable outcome of competition.

Company-owned and hired vehicles represent the major distribution cost item, accounting in the case of APCM, for example, for some 58 per cent of total distribution costs in 1977. Almost all of APCM's deliveries

in the UK are made by its own vehicle fleet, which comprises some 1,000 specialised bulk delivery vehicles and 500 flat platform vehicles for bagged deliveries. Hired transport occasionally supplements the company's own fleet for deliveries of bagged cement, but not for bulk deliveries. Delivery vehicles operated from the 16 works - each of which acts as a depot - and from 35 independent depots.

Long distance transport represents some 28 per cent of APCM's total distribution costs. It consists of linear trains which supply on a regular timetable 34 of the 35 depots, and coastal shipping which deliver cement to the offshore islands and to Northern Ireland. APCM would like to make greater use of water transport, utilising its experience of shipping up the Thames from Northfleet. Presently, high labour costs render this alternative uneconomic.

Operational research techniques on a computerized system is used by APCM to minimise total deliveried costs, though the constraint of satisfying special customer requirements presently is binding in the actual solutions achieved.

2. Long-run costs

The information available on the relationship between long-run cement production costs and capacity of works (i.e. returns to scale) is patchy and somewhat dated. In particular, all estimates predate the 1973 energy crisis. Nevertheless, the results are presented here with notice of their limitations.

Table 10 outlines the principal relationships between costs and scale for cement manufacture in Germany and in the USA, as outlined in a United Nations study published in 1963.

The results outlined in Table 10 were reviewed in greater detail for two hypothetical US cement works. These latter results are outlined in Table 11.

Table 10 Returns to Scale in Cement Manufacture (1963)

	Capacity of Works ('000 metric tons p.a.)						
	33	66	100	200	400	500	1,000
Fixed investment per ton of capacity:							
W. Germany (index)	200	146	121	100	79	-	-
USA (index)			120	100	83	80	56
Labour requirements:							
USA No. per '000 tons (index)			156	100	67	63	31
Unit costs per ton of capacity:							
W Germany (index)	150	121	114	100	86		
USA (index)			116	100	89	84	63

(Source: Studies in the Economics of Industry 1. United Nations, New York 1963)

Table 11 A Breakdown of Unit Costs for Two Hypothetical US works

	120,000 tons p.a.	1,000,000 tons p.a.	% of total saving
Cost		$ per ton	
Direct labour	3.70	0.90	32
Direct material and water	0.67	0.67	-
Power	2.10	2.10	-
Fuel	2.37	2.37	-
Indirect labour and overheads	3.37	1.61	20
Depreciation on fixed capital	4.93	2.53	27
Interest on fixed capital	3.89	2.00	21
	21.03	12.18	100

(Source: Studies in Economics of Industry 1.United Nations New York 1963)

As is evident from Table 10 substantial economies of scale existed in 1963 for labour, fixed capital and overhead costs, but no economies of scale for materials and fuel.

In 1968, Pratten published estimates, based on engineering simulations, of the relationship between scale and costs for new UK cement works. The importance of the assumptions about the number of kilns and mills installed in works was emphasised. In addition, it was assumed that the 2 million ton works was sited on the coast, as it was considered uneconomic to transport 1 million ton units to an inland site.

Table 12 Estimated Costs for New UK Cement Works 1968

Capacity (000 ton)	100	200	500	1,000	2,000
Number of kilns and mills	1	1	2	2	2
			Indices of costs		
Fuel and power	100	98	97	96	95
Wages and salaries	100	70	55	40	35
Depreciation and return on capital	100	80	70	58	47
Overheads	100	90	82	75	70
Average total costs	100	85	77	69	62
Value added	100	80	69	58	49
Marginal cost	100	70	72	61	55

(Source: Pratten, C.F. 'Economies of Scale in Manufacturing Industry' C.U.P. 1968 at p.92)

Although technical scale economies exist for individual kilns in cement production, process industries prefer, where possible, to have at least two units to provide flexibility for contingencies such as breakdowns and relining. In 1968, breakdowns represented 5 per cent of capacity per annum in the UK cement industry.

In conclusion, although scale economies exist in cement production, it is worth emphasising that these may be offset by managerial and distributive diseconomies if very large units were to be established. The fact that the average UK cement plant is smaller than that for continental Europe does not imply necessarily therefore that the UK cement makers are sacrificing available cost savings in cement manufacture and distribution as a whole.

Chapter 4 OWNERSHIP AND CONTROL

This chapter is concerned with answering four questions:

(a) To what extent are the firms in the UK cement industry connected by interlocking shareholdings?

(b) How extensive are interlocking directorates between companies?

(c) How concentrated is the ownership of the independent companies in the industry?

(d) Do company directors have significant interests in the capital of their own firms?

These questions will be considered for each of the six companies in the Cement Makers' Federation (Associated Portland Cement Manufacturers Ltd., Rugby Portland Cement Company Ltd., Tunnel Cement Ltd., Aberthaw and Bristol Channel Portland Cement Company Ltd., Ribblesdale Cement Ltd., Ketton Portland Cement Manufacturers Ltd), the main results being summarised in figures 1 and 2 and table 17. In all cases the information has been obtained from the relevant company reports and accounts for 1976.

Associated Portland

The largest of the cement manufacturers, Associated Portland is an independent company with relatively dispersed ownership. In 1976 no single shareholder owned 10% or more of the issued ordinary stock of the company. The size distribution of shareholdings in that year was as shown overleaf.

Associated Portland held 26% of the issued ordinary share capital of Aberthaw Cement and appointed one representative to the six-member board of directors of the latter. The representative concerned was also a director of Associated Portland. Finally, the combined shareholdings of APCM's board of directors, including family interests, accounted for only 0.04% of the issued ordinary stock of the company.

Table 13

Size of holding of ordinary £1 stock	Number of holders	Total holdings	Percentage of total accounts	Percentage of ordinary capital
1 - 250	13,274	1,913,497	30.3	2.4
251 - 500	11,843	4,388,652	27.0	5.4
501 - 1,000	10,264	7,601,412	23.4	9.4
1,001 - 5,000	7,534	14,149,034	17.2	17.5
5,001 - 10,000	385	2,652,809	0.9	3.3
10,001 - 20,000	163	2,458,711	0.4	3.0
20,001 - 50,000	160	5,355,747	0.4	6.6
50,001 - 100,000	75	5,599,875	0.2	6.9
100,001 - 200,000	59	8,669,867	0.1	10.7
200,001 and above	56	28,194,675	0.1	34.8
Totals	43,813	80,984,279	100.0	100.0

Rugby Portland

Rugby Portland is the only firm in the UK industry which is not connected with another member of the Cement Makers' Federation through interlocking shareholdings and directorships. The ownership of the company is relatively dispersed, the distribution of shareholdings in 1976 is as shown overleaf.

No single holding accounted for 10% or more of the issued share capital of the company and the directors' interests totalled 0.25% of the ordinary and 1.63% of the participating shares.

Table 14

Ordinary Shares (nominal value 25p)				
Size of holding	Number of holders	Total holding	Percentage of total accounts	Percentage of ordinary shares
1 - 100	1,422	81,952	5.5	0.1
101 - 250	3,878	677,618	15.0	1.0
251 - 500	4,862	1,808,428	18.8	2.6
501 - 1,000	6,193	4,479,584	24.0	6.4
1,001 - 5,000	8,301	16,784,589	32.2	23.8
5,001 - 10,000	707	4,858,716	2.7	6.9
10,001 - 50,000	326	6,301,598	1.3	9.0
50,001 and above	117	35,407,515	0.5	50.3
Totals	25,806	70,400,000	100.0	100.0

Table 15

Participating Shares (non-voting, nominal value 5p)				
Size of holding	Number of holders	Total holding	Percentage of total accounts	Percentage of participating shares
1 - 100	40	2,603	1.6	0.0
101 - 250	96	16,496	3.9	0.1
251 - 500	246	90,240	9.9	0.3
501 - 1,000	486	358,433	19.5	1.1
1,001 - 5,000	1,245	2,787,539	49.9	8.6
5,001 - 10,000	211	1,451,156	8.5	4.5
10,001 - 50,000	101	2,067,759	4.1	6.4
50,001 and above	68	25,625,774	2.7	79.1
Totals	2,493	32,400,000	100.0	100.0

Tunnel Cement

Tunnel Cement is part of the group now known as Tunnel Holdings Ltd. 4.3% of the 'B' and 100% of the 'C' ordinary shares of the parent company are owned by Thos. W. Ward Ltd., a firm with major interests in steel, engineering and vehicles as well as cement. These shares entitle Thos. W. Ward Ltd to 29.9 % of the votes attached to the ordinary capital of Tunnel Holdings Ltd. Prior to 1973 a substantial financial interest in Tunnel Cement Ltd had been held (since 1911) by the Danish group F.L. Smidth & Co. A/S, whose principal business is the manufacture of cement making machinery together with the provision of advice and support in the design and building of cement works across the world. However, the Smidth group eventually decided that a large stake in one of the major UK cement manufacturers conflicted to some extent with their main activities and in 1973 Thos. W. Ward Ltd. acquired their holding - which at that time accounted for 2,742,910 'A' shares (carrying one vote per share), 382,181 'B' stock units (carrying one vote per two units of stock) and 40% of the total votes. The Panel on Take-Overs and Mergers would only consent to the transfer of such a large block of shares if Thos. W. Ward agreed to a certain reduction in the voting powers of the equity they had purchased. Subsequently all 'A' shares acquired by the Ward group were converted into a new class of 'C' shares with voting rights governed by a formula which reduced the entitlement from 40% to 29.99% of the votes. Upon completion of the transaction, two directors of the Ward group joined the Tunnel board in place of the resigning Danish directors nominated by F.L. Smidth and Co., and since that time Thos. W. Ward Ltd., have contined to provide two directors for the company. In 1976 the Tunnel board had nine members.

Apart from the Ward shares, no other holding accounts for 10% or more of the issued share capital of Tunnel However, Tunnel Holdings Ltd. itself has a 50% interest in Ribblesdale Cement Ltd., the other 50% being owned by

Ketton Cement Ltd. - a wholly owned subsidiary of Thos. W. Ward Ltd.

Three directors of Tunnel are members of the seven-member Ribblesdale board.

In March 1977 the directors of Tunnel and their families owned 0.77% of the 'B' ordinary shares of the company.

Aberthaw Cement

In 1977, approximately 26% of the ordinary share capital of Aberthaw was held by Associated Portland. Apart from this block, no other holding accounted for 10% or more of the ordinary shares, which were distributed as follows:

Table 16

Size of holding	Number of holders	Total holding	Percentage of accounts	Percentage of ordinary shares
1 - 500	590	155,693	53.8	4.0
501 - 1,000	200	164,490	18.2	4.2
1,001 - 5,000	235	531,874	21.4	13.7
5,001 - 10,000	28	201,242	2.6	5.2
10,001 - 20,000	24	358,652	2.2	9.2
20,001 - 50,000	5	189,572	0.5	4.9
50,001 - 100,000	11	849,276	1.0	21.9
100,001 and above (including APCM, 1 million)	4	1,434,958	0.4	36.9
Totals	1,097	3,885,757	100.0	100.0

Associated Portland are represented by one of their directors on the Aberthaw board (made up of six members in 1976).

The beneficial and non-beneficial shareholdings of the Aberthaw directors accounted for 6.4% and 4.5% respectively of the company's ordinary shares on 31st December 1976.

Ribblesdale Cement Ltd

Ribblesdale is owned jointly by Tunnel Holdings Ltd and Ketton Cement Ltd., each of the latter companies having a 50% stake. Since Ketton is a wholly owned subsidiary of Thos. W. Ward Ltd., who also have a substantial holding in Tunnel, this implies that, indirectly, the Ward group have a majority interest in Ribblesdale.

The seven-member board of directors consists of three representatives each from Tunnel and Ketton together with an independent managing director. The chairmanship of the board rotates bi-annually between appointees of the two companies.

Ketton Cement Ltd

Ketton Cement Ltd. is now part of the Thos. W. Ward group of companies, who therefore appoint its directors. Thos. W. Ward obtained complete control in the summer of 1973 (at which time they were also acquiring their interest in Tunnel), having previously held 73.6% of the ordinary shares. Ward had also acted as the sole selling agents for Ketton's products before 1973.

Ketton has a 50% interest in Ribblesdale Cement Ltd and appoints thre- representatives to the latter's seven-member board of directors.

SUMMARY

There are significant connections between the companies in the UK cement industry in the form of interlocking shareholdings and interlocking director- ships. Two firms, Ketton and Ribblesdale, are wholly owned by other firms involved in the industry, while substantial proportions of the ordinary capital of Tunnel and Aberthaw are also held by other companies. These ownership links are paralleled by a similar set of interlocking directorships.

The two independent companies, Associated Portland and Rugby Portland, have relatively diffuse ownership. With the exception of Aberthaw, the prop- ortion of each company's stock held by its board of directors is trivially small.

Figure 1: Interlocking Shareholdings 1976 (Ordinary Shares only)

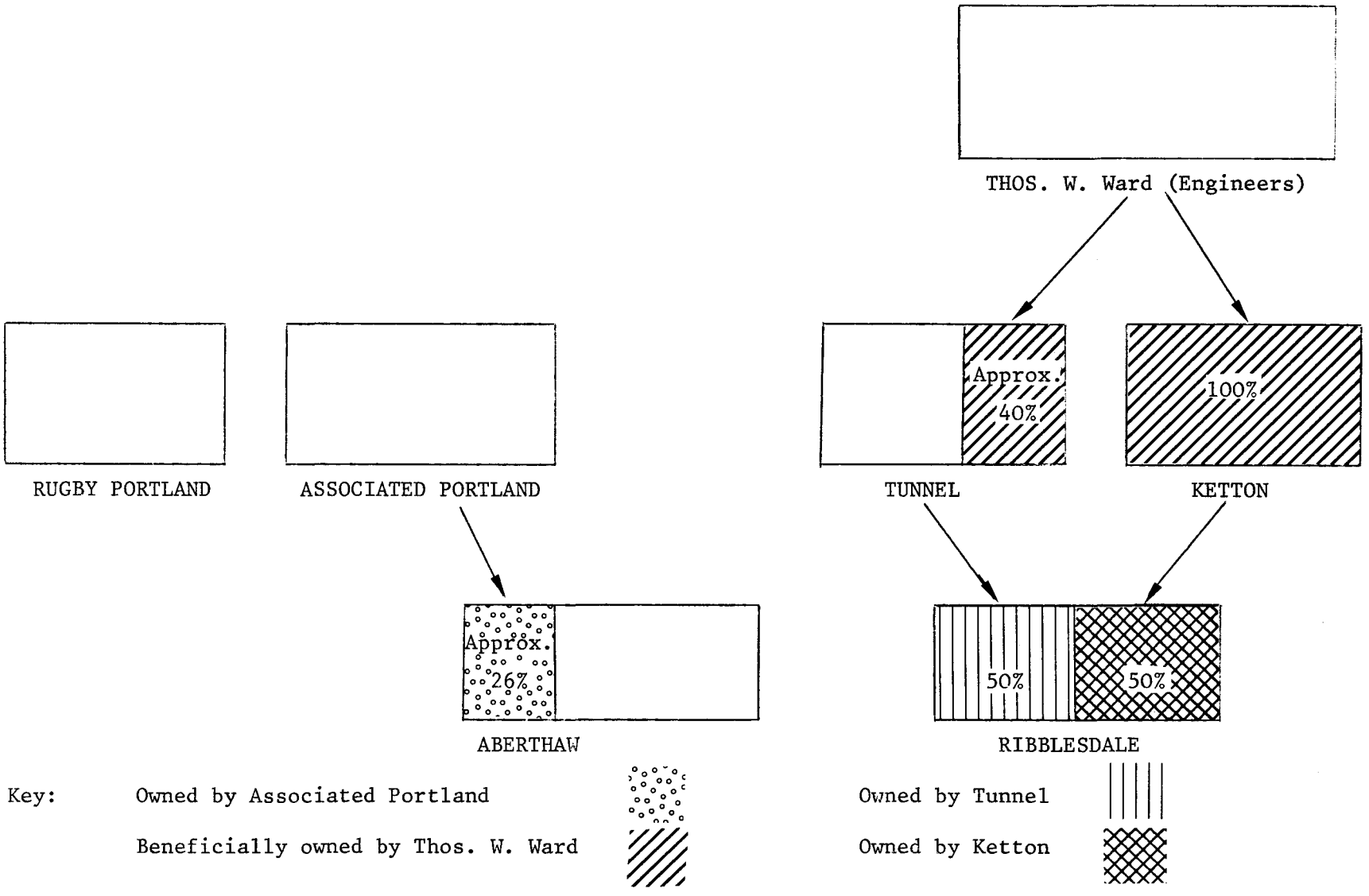
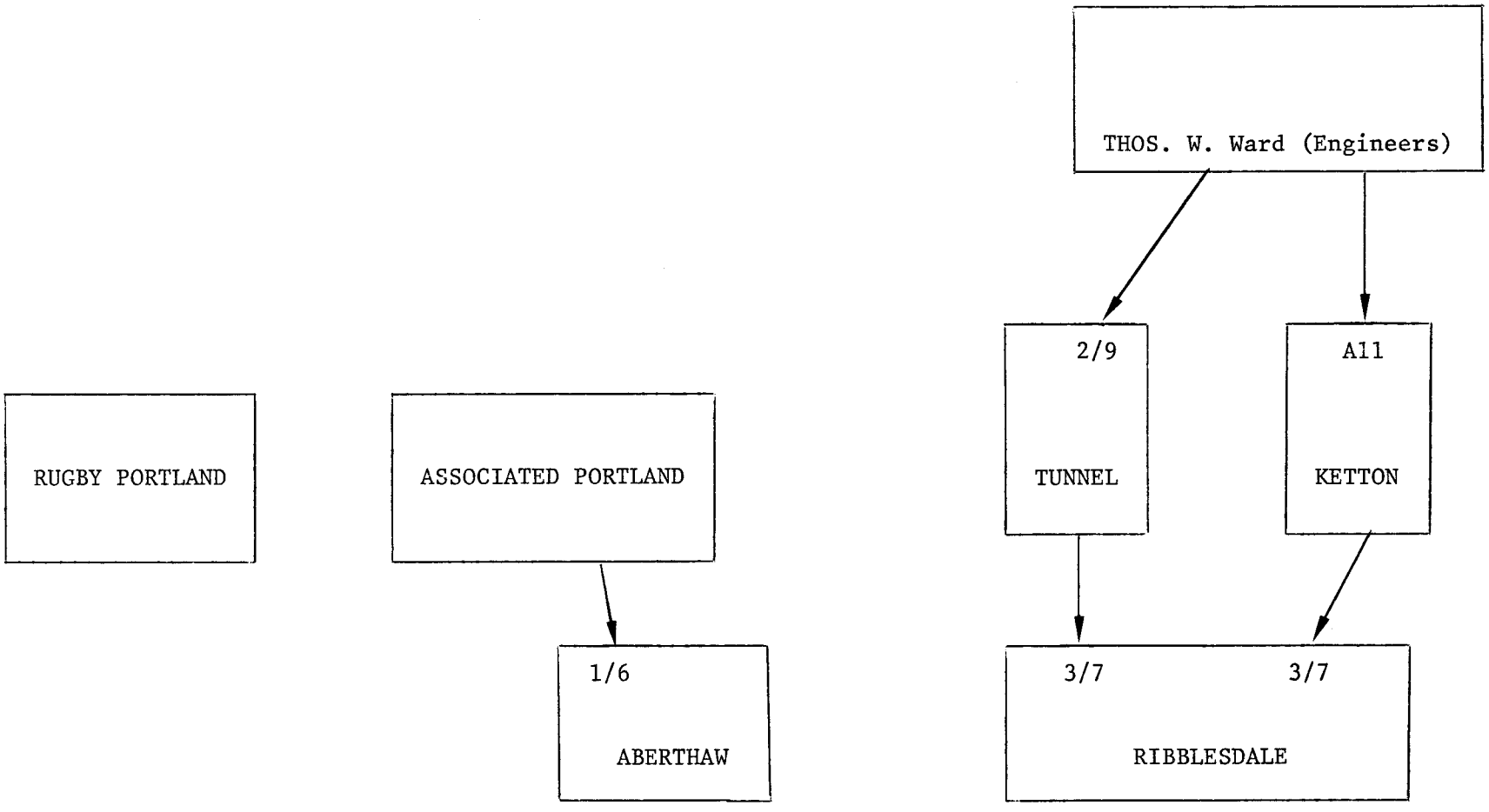


Figure 2: Interlocking Directorships 1976



Key: Arrows point to fraction of directors nominated.

Table 17 Ownership of Ordinary Shares 1976 *

Company	Type of share	Nominal Value	Number Issued (thousands)	Large holdings: beneficial owner and percentage of shares held	Directors' holdings (thousands)	Directors' holdings as a percentage of shares issued
Associated Portland	Ordinary stock	£1	81000	-	31.196	0.04
Rugby Portland	Ordinary shares	25p	70400	-	173.196	0.25
	Participating (non-voting) shares	5p	32400	-	528.150	1.63
Tunnel	'A' Ordinary shares	50p	137.09	-	-	-
	'B' Ordinary shares	50p	8860.190	-	67.915	0.77
	'C' Ordinary shares	50p	2742.910	Thos. Ward (100%)	-	-
Aberthaw	Ordinary shares	25p	3885.757	Associated Portland (26%)	423.559	10.9

* Ketton and Ribblesdale are not included, both being completely owned by other companies.

Chapter 5 RECENT DEVELOPMENTS IN THE CONCENTRATION OF THE CEMENT INDUSTRY

1. General Remarks

This chapter is concerned with recent movements in various indices of concentration for the cement industry. The statistical measures used are as follows:

Absolute measures of concentration

- Concentration ratios
- Herfindahl index
- Entropy index
- Hall-Tideman index
- Linda index for all firms in the industry

Relative measures of concentration

- Coefficient of variation
- Redundancy index
- Gini coefficient
- Linda indices for subsamples of firms in the industry
- Variance of logarithms

The relative measures are designed to assess the inequalities within a given sample of observations, whereas the absolute measures are intended to provide comparisons between the observed distributions and some notion of a "perfectly competitive" industry. For example, the Gini coefficient and the variance of logarithms both take the same value (zero) for an industry composed of two firms of equal size as for an industry containing three identical firms. In contrast, the Herfindahl and Hall-Tideman indices would indicate that the latter structure was less concentrated.

For the purposes of the present analysis this distinction between the types of index is of little importance however, since the number of firms

in the cement industry has not changed during the period of interest. In such circumstances it can be shown that there exist positive monotonic relationships between various absolute and relative indices (see Appendix B). The measures linked by these relationships are:

the Herfindahl index and the coefficient of variation,

the Entropy index and the redundancy index,

the Hall-Tideman index and the Gini coefficient.

Since the above pairs contain the same statistical information for the UK cement industry, graphs of the movements of the indices have only been presented for the absolute measures, although tabulations of both sets of indices have been provided.

The analysis which follows is divided into two major sections dealing with the concentration of output and of other variables (employment, capital, sales, etc.) respectively. This has been done because extremely good data on market shares for Portland Cement, based on output figures, is publicly available through the 1978 Price Commission study of the Associated Portland Cement Manufacturers. The output data has therefore been subjected to a fairly comprehensive analysis, while the less complete information on the other variables of interest is presented in a more summarised form.

2. Concentration Movements in the Supply of Portland Cement

The basic data for shares of the Portland Cement market is shown in table 18. Portland Cements account for over 90% of total cement sales in the UK and movements in relative shares for this market provide accurate indicators of developments in the industry as a whole. For example, it can be seen from the table that APCM's share of the Portland Cement market fell from 61% in 1975 to 60% in 1976 and then to 59% in 1977. Over the same period the company's share of the total cement market moved in a similar fashion from 62% in 1975 to 61% in 1976 and 60% in 1977.

The Period 1968-77

Table 18 indicates that the share of the principal producer, APCM, has fluctuated around a slightly downward trend (continued from earlier years) since 1968, tending to move upwards when demand is increasing and downwards when demand is decreasing (for 1968-77, demand has "highs" in 1968 and 1973, and "lows" in 1970 and 1977). Of the two intermediate sized produceers, Rugby has steadily increased its market share while Tunnel has fallen back, particularly since 1972. These relative movements are in line with what might be expected from the profit margins of the two companies, Rugby having a significantly higher ratio of profit to turnover than Tunnel. Finally, the market shares of the three smaller companies have steadily increased over the ten-year period.

Future Prospects

In 1977 APCM operated at a little over 80% of estimated production capacity; Rugby, Ribblesdale and Aberthaw at around 75%; Tunnel at 95% and Ketton at 10%, the latter raising its capacity by 14% in 1978. The gradual recovery of demand expected by the industry over the years 1978-80 is therefore likely to be of most benefit to the market shares of the first four companies.

Ownership Considerations

In interpreting the movements in the market shares of the six companies, it is important to take into account the common ownership arrangements explained in Chapter 4. With these factors in mind two further sets of market share data have been calculated and are shown in tables 19 and 20. In table 19 the market share of Ribblesdale has been allocated equally between Tunnel and Ketton since these latter two companies each have a 50% stake in Ribblesdale and dominate its board of directors. In

table 20, Aberthaw's market share has been added to that of APCM, while Tunnel, Ketton and Ribblesdale have been consolidated into a single group representing the holdings of Thos. Ward. The latter aggregation is appropriate when the interest lies in the concentration of ultimate control in the market, on the assumption that the 26% stake of APCM in Aberthaw and the 30% stake of Thos. Ward in Tunnel represent controlling blocks of shares.

The trends shown by table 19 are very similar to those in the unadjusted data. The addition of 50% of Ribblesdale's (rising) market share to Tunnel's does not prevent the downward movement of the combined figure. However, table 20 presents a rather more static picture. The smaller market shares have disappeared and Rugby becomes the smallest of the three groupings. APCM's market share shows the same pro-cyclical variations as before but there is now little indication of a downward trend. The Ward group has lost a fraction of its share over the period, but Tunnel's contraction has almost been counterbalanced by the progress of Ketton and Ribblesdale.

Concentration Ratios

Tables 21, 22 and 23 and figures 3, 4 and 5 show the behaviour of the various concentration ratios over the period, calculated from tables 18, 19 and 20 respectively. The most significant changes since 1968 are the relatively steady falls in the three-firm concentration ratios C_3^a and C_3^b resulting from the increasing market shares of the smaller companies. The fall is greatest for the unadjusted data, which implies a decline from 88.5% in 1968 to 84.5% in 1977. The two-firm concentration ratio for the unadjusted data shows a slight upward trend, reflecting the increasing market share of Rugby since around 1970; but this ceases to be the case when C_2 is calculated from tables 19 and 20. Overall, the movement of the concentration ratios suggests some movement towards a more "competitive" industrial structure between 1968 and 1977.

Herfindahl Indices

The movement of the Herfindahl index is strongly influenced by the fluctuations in APCM's share of the market, since the APCM term in the formula for the index accounts for about 90% of the latter's value. It can be seen from tables 24 and 25, together with the corresponding graphs, that H^a and H^b (calculated from tables 18 and 19 respectively) show a clear downward trend together with a strong cyclical movement which correlates with demand fluctuations. The cyclical variation is due chiefly to the pattern in APCM's market share outlined earlier. However, the trend in the index disappears when table is used as the basis of the calculations. In this case the trend level of concentration in the industry appears to be fairly static over the period.

In summary, then, the Herfindahl indices indicate:

(a) a trend towards reduced concentration among the operating units (firms) in the industry;

(b) little longer-run movement in the concentration of ultimate "control";

(c) a strong pro-cyclical movement of concentration, irrespective of which data is used to calculate the index.

Coefficient of Variation

The values of the coefficient of variation for each of the three sets of data are shown in table 25. The coefficient of variation is related to the Herfindahl index by the formula (see appendix A).

$$CV = \sqrt{N.H - 1}$$

where N is the number of firms in the industry. Since N is constant between 1968 and 1977 there is a positive, monotonic relationship between the two statistics. Hence, graphs of the coefficient of variation through time follow a similar pattern to those in figure 6, and the CVs yield the same conclusions as the Herfindahl indices.

Entropy Indices

The entropy indices for the data in tables 18, 19 and 20 are shown in tables 26 and figure 7. Bearing in mind that an increase in the entropy measure represents a decrease in concentration, the statistics show the same pattern as the Herfindahl indices although, because E attaches a little more weight to the smaller firms, the trend movements are more pronounced and the cyclical variations less severe.

Redundancy Indices

The redundancy measure (R) is related to the entropy index by the formula:

$$R = \log_2 N - E$$

Since N is constant over the period under examination, R contains the same information as E. The values of R are shown in table

Hall-Tideman Indices

The Hall-Tideman is another index which attaches more weight to the smaller firms than the Herfindahl. Its values are shown in table figure 8. Again the pattern is one of a pro-cyclical movement in concentration superimposed on a definite downward trend when the index is calculated from tables 18 and 19. However, this index also suggests, in contrast to the earlier results, a downward trend in the concentration of "control" (i.e. T^c also shows a downward movement over the ten years). The difference can be explained by the extra weight given by the Hall-Tideman to the smaller firms. Thus, in case c, the index is rather more influenced by the increasing market share of the smallest grouping (Rugby) than the previous measures.

The Gini-Coefficient

Values of the Gini coefficient, derived from tables 18, 19 and 20 are given in table 29. The Gini coefficient (G) is related to the Hall-Tideman

index by the formula

$$G = 1 - \frac{1}{N.T} .$$

With N fixed it is therefore directly linked to T and provides the same information.

Variance of Logarithms

The variance of logarithms is most useful as a measure of concentration when the underlying size distribution of firms is lognormal or approximately lognormal. This is not the case in the UK cement industry, but values of the index - shown in table 30 and figure 9 - are included for completeness. Inspection of the data reveals that, for this Index, the cyclical movements in concentration are highly attenuated and the downward trend is very pronounced in cases a and b. The trend, though smaller, can also be discerned in case c. Once more this behaviour of the statistic is due to the relatively high weight it gives to the smaller firms, which have been increasing their market shares over the last ten years.

Linda Indices

The final set of statistics used to examine the development in concentration in the present study are the Linda indices. Linda indices can be calculated either for the complete industry or for the largest n (< N) firms in the industry, where n is an arbitrary integer greater than or equal to two. Since there are only six firms in the UK cement industry the full set of Linda indices for each of tables 18, 19 and 20 are given in tables 31, 32 and 33, and are graphed in figures 10, 11 and 12.

The three indices relating to the complete industry are, for comparative purposes, graphed together in figure 13. All three show an unmistakeable cyclical pattern and downward trend. It should be noted that in case c, while the decline in the index is not as great as in the

other two cases, the general downward movement through time is clearly visible. Comparing the value of the indices in "high" concentration years 1968 and 1974, and in the "low" concentration years 1971/2 and 1977 yields the following percentage falls:

% fall in	between		
L_6^a	1968 & 1974	=	6.1%
L_6^a	1971 & 1977	=	4.7%
L_5^b	1968 & 1974	=	8.6%
L_5^b	1972 & 1977	=	5.7%
L_3^c	1968 & 1974	=	5.6%
L_3^c	1971 & 1977	=	2.2%

The remaining Linda indices show how concentration has changed within subsamples of the largest n (< N) firms. Thus, for example, L_2^a has declined in recent years because of the growth in the market share of Rugby relative to that of APCM. Again, the cause of the rise in L_3^a is the decline of Tunnel, which has increased the degree of inequality between the three largest firms. Movements in the other indices can be explained in a similar fashion.

Conclusions

All the indices calculated above for the unadjusted data of table show (a) a trend decline in concentration over the period 1968-77, and (b) a pro-cyclical movement in concentration around this trend. These findings also hold when the market share of Ribblesdale is divided between Ketton and Tunnel to yield the data in table 19. However, the further aggregation of market shares undertaken in table 20 leads to less clear-cut results. A trend decline is just visible in the Hall-Tideman index, more pronounced for the variance of logarithms and the Linda indices, but

apparently non-existent for the Herfindahl and Entropy measures. The difference appears to be linked to the weighting given by the indices to the smaller firms in the market, since it is the latter which have made the highest proportionate gains in market share. Thus, those indices which give more weight to the smaller units, such as the variance of logarithms and the Linda indices, show the greatest relative decline over the ten year period. Whatever interpretation is placed upon the statistics in case c, it can safely be concluded that there has been no tendency for concentration, however measured, to increase in the last ten years.

Table 18 Percentage Shares of the UK Market for Portland Cements (in tonnage terms)

Year	APCM	Rugby	Tunnel	Ribblesdale	Aberthaw	Ketton
1968	62.0	13.0	13.5	4.0	4.0	3.5
1969	61.5	13.0	13.5	4.5	4.0	3.5
1970	60.5	13.0	13.5	4.5	4.5	4.0
1971	59.0	14.5	13.5	4.5	4.5	4.0
1972	60.0	14.0	13.0	4.0	5.0	4.0
1973	61.0	14.5	11.5	4.5	5.0	3.5
1974	61.5	14.5	11.0	4.5	4.5	4.0
1975	61.0	14.5	10.5	5.0	5.0	4.0
1976	60.0	15.0	10.5	5.0	5.0	4.5
1977	59.0	15.5	10.0	5.5	5.0	5.0

Table 19 Percentage Shares of the UK Market for Portland Cements (in tonnage terms)

Year	APCM	Rugby	Tunnel & ½ Ribblesdale	Ketton & ½ Ribblesdale	Aberthaw
1968	62.0	13.0	15.5	5.5	4.0
1969	61.5	13.0	15.75	5.75	4.0
1970	60.5	13.0	15.75	6.25	4.5
1971	59.0	14.5	15.75	6.25	4.5
1972	60.0	14.0	15.0	6.0	5.0
1973	61.0	14.5	13.75	5.75	5.0
1974	61.5	14.5	13.25	6.25	4.5
1975	61.0	14.5	13.0	6.5	5.0
1976	60.0	15.0	13.0	7.0	5.0
1977	59.0	15.5	12.75	7.75	5.0

Table 20 Percentage Shares of the UK Market for Portland Cements (in tonnage terms)

Year	APCM and associates	Thos. Ward and associates	Rugby
1968	66.0	21.0	13.0
1969	65.5	21.5	13.0
1970	65.0	22.0	13.0
1971	63.5	22.0	14.5
1972	65.0	21.0	14.0
1973	66.0	19.5	14.5
1974	66.0	19.5	14.5
1975	66.0	19.5	14.5
1976	65.0	20.0	15.0
1977	64.0	20.5	15.5

Table 21 Concentration Ratios for Output of Portland Cement

Year	C1[a]	C2[a]	C3[a]	C4[a]	C5[a]	C6[a]
1968	62.0	75.5	88.5	92.5	96.5	100.0
1969	61.5	75.0	88.0	92.5	96.5	100.0
1970	60.5	74.0	87.0	91.5	96.0	100.0
1971	59.0	73.5	87.0	91.5	96.0	100.0
1972	60.0	74.0	87.0	92.0	96.0	100.0
1973	61.0	75.5	87.0	92.0	96.5	100.0
1974	61.5	76.0	87.0	91.5	96.0	100.0
1975	61.0	75.5	86.0	91.0	96.0	100.0
1976	60.0	75.0	85.5	90.5	95.5	100.0
1977	59.0	74.5	84.5	90.0	95.0	100.0

Table 22 Concentration Ratios for Output of Portland Cement

Year	C1[b]	C2[b]	C3[b]	C4[b]	C5[b]
1968	62.0	77.5	90.5	96.0	100.0
1969	61.5	77.25	90.25	96.0	100.0
1970	60.5	76.25	89.25	95.5	100.0
1971	59.0	74.75	89.25	95.5	100.0
1972	60.0	75.0	89.0	95.0	100.0
1973	61.0	75.5	89.25	95.0	100.0
1974	61.5	76.0	89.25	95.5	100.0
1975	61.0	75.5	88.5	95.0	100.0
1976	60.0	75.0	88.0	95.0	100.0
1977	59.0	74.5	87.25	95.0	100.0

Table 23 Concentration Ratios for Output of Portland Cement

Year	$C1^c$	$C2^c$	$C3^c$
1968	66.0	87.0	100.0
1969	65.5	87.0	100.0
1970	65.0	87.0	100.0
1971	63.5	85.5	100.0
1972	65.0	86.0	100.0
1973	66.0	85.5	100.0
1974	66.0	85.5	100.0
1975	66.0	85.5	100.0
1976	65.0	85.0	100.0
1977	64.0	84.5	100.0

Table 24 Herfindahl Indices for Output of Portland Cements

Year	H^a	H^b	H^c
1968	0.424	0.430	0.497
1969	0.418	0.425	0.492
1970	0.407	0.414	0.488
1971	0.393	0.400	0.473
1972	0.402	0.408	0.486
1973	0.412	0.418	0.495
1974	0.417	0.423	0.495
1975	0.411	0.417	0.495
1976	0.401	0.407	0.485
1977	0.390	0.397	0.476

Table 25 Coefficients of Variation for Output of Portland Cement

Year	CV^a	CV^b	CV^c
1968	1.243	1.072	0.701
1969	1.228	1.061	0.690
1970	1.201	1.034	0.681
1971	1.165	1.000	0.647
1972	1.188	1.020	0.677
1973	1.213	1.044	0.696
1974	1.226	1.056	0.696
1975	1.211	1.042	0.696
1976	1.186	1.017	0.675
1977	1.158	0.992	0.654

Table 26 Entropy Indices for Output of Portland Cements

Year	E^a	E^b	E^c
1968	1.741	1.643	1.251
1969	1.760	1.663	1.259
1970	1.800	1.692	1.268
1971	1.831	1.724	1.301
1972	1.810	1.710	1.274
1973	1.784	1.686	1.259
1974	1.788	1.666	1.259
1975	1.798	1.694	1.259
1976	1.828	1.720	1.279
1977	1.860	1.746	1.298

Table 27 Redundancy Index for Output of Portland Cements

Year	R^a	R^b	R^c
1968	0.844	0.679	0.334
1969	0.825	0.659	0.326
1970	0.785	0.630	0.317
1971	0.754	0.598	0.284
1972	0.775	0.612	0.311
1973	0.801	0.636	0.326
1974	0.797	0.656	0.326
1975	0.787	0.628	0.326
1976	0.757	0.602	0.306
1977	0.725	0.576	0.287

Table 28 Hall-Tideman Indices for Output of Portland Cements

Year	T^a	T^b	T^c
1968	0.370	0.403	0.515
1969	0.366	0.400	0.513
1970	0.355	0.389	0.510
1971	0.350	0.380	0.495
1972	0.355	0.382	0.505
1973	0.362	0.387	0.508
1974	0.362	0.391	0.508
1975	0.356	0.385	0.508
1976	0.349	0.379	0.500
1977	0.340	0.372	0.493

Table 29 Gini Coefficients for Output of Portland Cements

Year	G^a	G^b	G^c
1968	0.550	0.504	0.353
1969	0.545	0.500	0.350
1970	0.531	0.486	0.346
1971	0.524	0.474	0.327
1972	0.531	0.476	0.340
1973	0.540	0.483	0.344
1974	0.540	0.488	0.344
1975	0.532	0.481	0.344
1976	0.522	0.472	0.333
1977	0.510	0.462	0.324

Table 30 Variance of Logarithms for Output of Portland Cement

Year	V^a	V^b	V^c
1968	1.038	0.916	0.465
1969	1.002	0.899	0.457
1970	0.919	0.813	0.449
1971	0.916	0.800	0.386
1972	0.925	0.775	0.422
1973	0.940	0.797	0.430
1974	0.926	0.818	0.430
1975	0.869	0.759	0.430
1976	0.829	0.731	0.402
1977	0.776	0.699	0.376

Table 31 Linda Indices for Output of Portland Cement

Year	L_2^a	L_3^a	L_4^a	L_5^a	L_6^a
1968	2.296	1.264	1.493	1.287	1.157
1969	2.278	1.254	1.396	1.247	1.132
1970	2.241	1.235	1.377	1.201	1.043
1971	2.034	1.156	1.331	1.172	1.020
1972	2.143	1.215	1.295	1.195	1.045
1973	2.103	1.329	1.357	1.206	1.081
1974	2.121	1.380	1.450	1.250	1.086
1975	2.103	1.413	1.392	1.196	1.046
1976	2.000	1.380	1.370	1.180	1.012
1977	1.903	1.392	1.346	1.150	0.972

Table 32 Linda Indices for Output of Portland Cement

Year	L_2^b	L_3^b	L_4^b	L_5^b
1968	2.000	1.222	1.262	1.202
1969	1.952	1.208	1.225	1.183
1970	1.921	1.190	1.159	1.089
1971	1.873	1.080	1.101	1.052
1972	2.000	1.136	1.153	1.032
1973	2.103	1.177	1.202	1.058
1974	2.121	1.217	1.174	1.099
1975	2.103	1.223	1.149	1.038
1976	2.000	1.195	1.090	1.007
1977	1.903	1.183	1.025	0.973

Table 33 Linda Indices for Output of Portland Cement

Year	L_2^c	L_3^c
1968	3.142	1.205
1969	3.047	1.191
1970	2.955	1.177
1971	2.886	1.071
1972	3.095	1.131
1973	3.385	1.138
1974	3.385	1.138
1975	3.385	1.138
1976	3.250	1.091
1977	3.122	1.047

Appendix A: Definitions of Symbols

Subscript i denotes ith largest firm in industry.

s_i = share of relevant variable accounted for by the ith largest firm.

x_i = magnitude of relevant variable for ith largest firm.

Bars over symbols denote means.

n denotes nth largest firm.

N = total number of firms in the industry.

CV = Coefficient of variation.

H = Herfindahl index.

E = Entropy index.

R = Redundancy index.

T = Hall-Tideman index.

G = Gini coefficient.

V = Variance of logarithms.

L_n = Linda index for n largest firms.

Appendix B: Definitions of Concentration Measures

1. The n-firm concentration ratio

$$Cn = 100 \sum_{i=1}^{n} S_i$$

2. The Herfindahl index

$$H = \sum_{i=1}^{N} S_i^2$$

3. The coefficient of variation

$$CV = \frac{1}{\bar{X}} \sqrt{\frac{1}{N} \sum_{i=1}^{N} (X_i - \bar{X})^2}$$

A relationship between CV and H can be derived in the following manner:

$$CV = \frac{1}{\bar{X}} \sqrt{\frac{1}{N} \sum_{i=1}^{N} X_i^2 - \bar{X}^2}$$

$$= \sqrt{\frac{N}{N^2\bar{X}^2} \sum_{i=1}^{N} X_i^2 - 1}$$

$$= \sqrt{N \sum_{i=1}^{N} \left(\frac{x_i}{N\bar{X}}\right)^2 - 1}$$

$$= \sqrt{N \sum_{i=1}^{N} S_i^2 - 1}$$

$$= \sqrt{N.H - 1}$$

4. Entropy index

$$E = - \sum_{i=1}^{N} S_i \log_2 S_i$$

5. Redundancy Index

$$R = \log_2 N - E$$

6. Hall-Tideman Index

$$T = \frac{1}{2 \sum_{i=1}^{N} iS_i - 1}$$

7. Gini coefficient

$$G = \frac{N + 1 - 2 \sum_{i=1}^{N} iS_i}{N}$$

But from the expression for T:

$$2 \sum_{i=1}^{N} iS_i = \frac{1 + T}{T}$$

$$\therefore \quad G = 1 + \frac{1}{N} + \frac{1}{N} \left(\frac{1 + T}{T}\right)$$

$$= 1 - \frac{1}{N.T}$$

8. Variance of logarithms

$$V = \frac{1}{N} \sum_{i=1}^{N} (\log_e S_i - \overline{\log_e S_i})^2$$

9. Linda indices

$$L_n = \frac{1}{n(n-1)} \sum_{i=1}^{n-1} \frac{n-i}{i} \cdot \frac{C_i}{C_n - C_i}$$

FIGURE 3 : CONCENTRATION RATIOS, 1968-1977

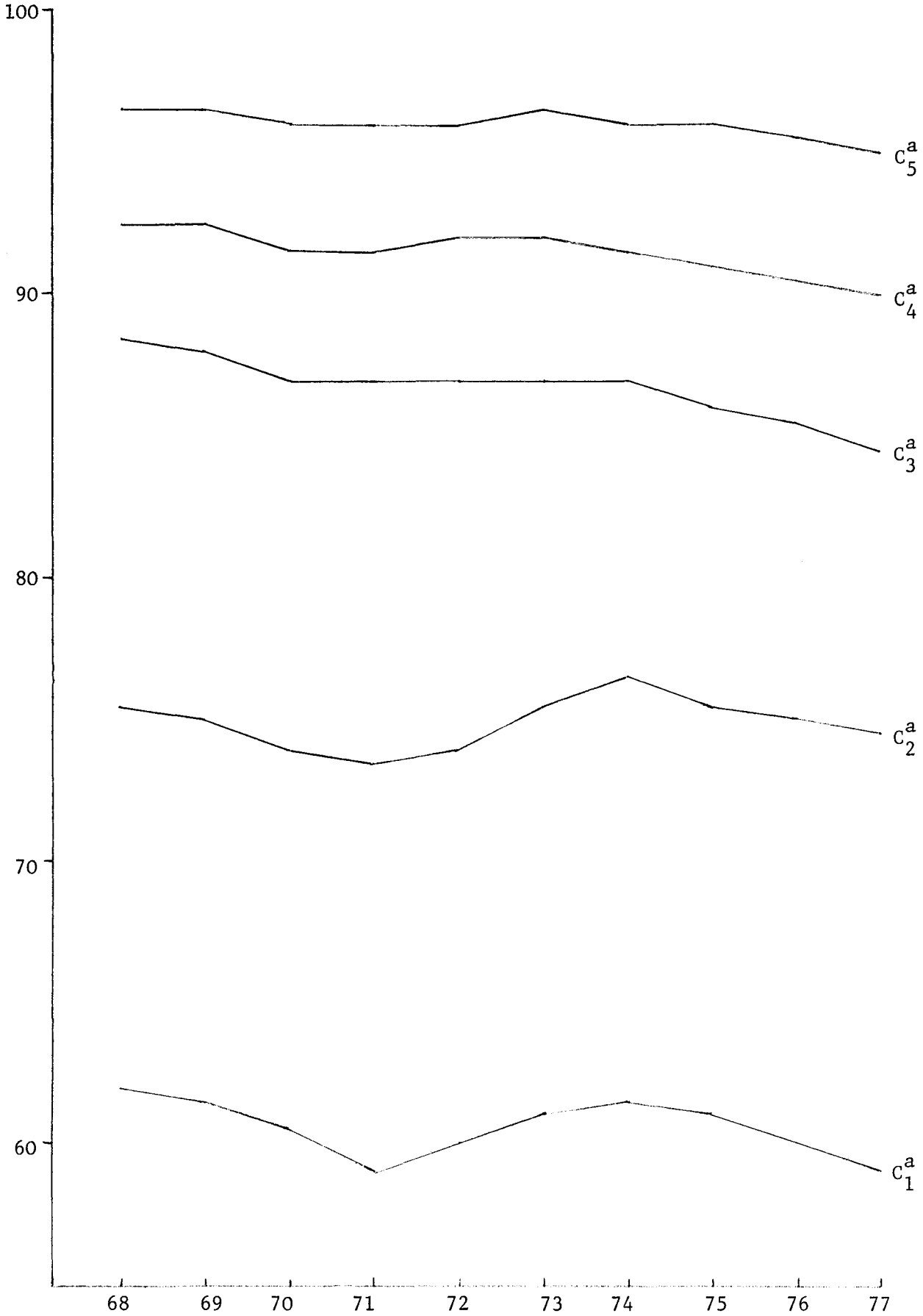


FIGURE 4 : CONCENTRATION RATIOS, 1968-1977

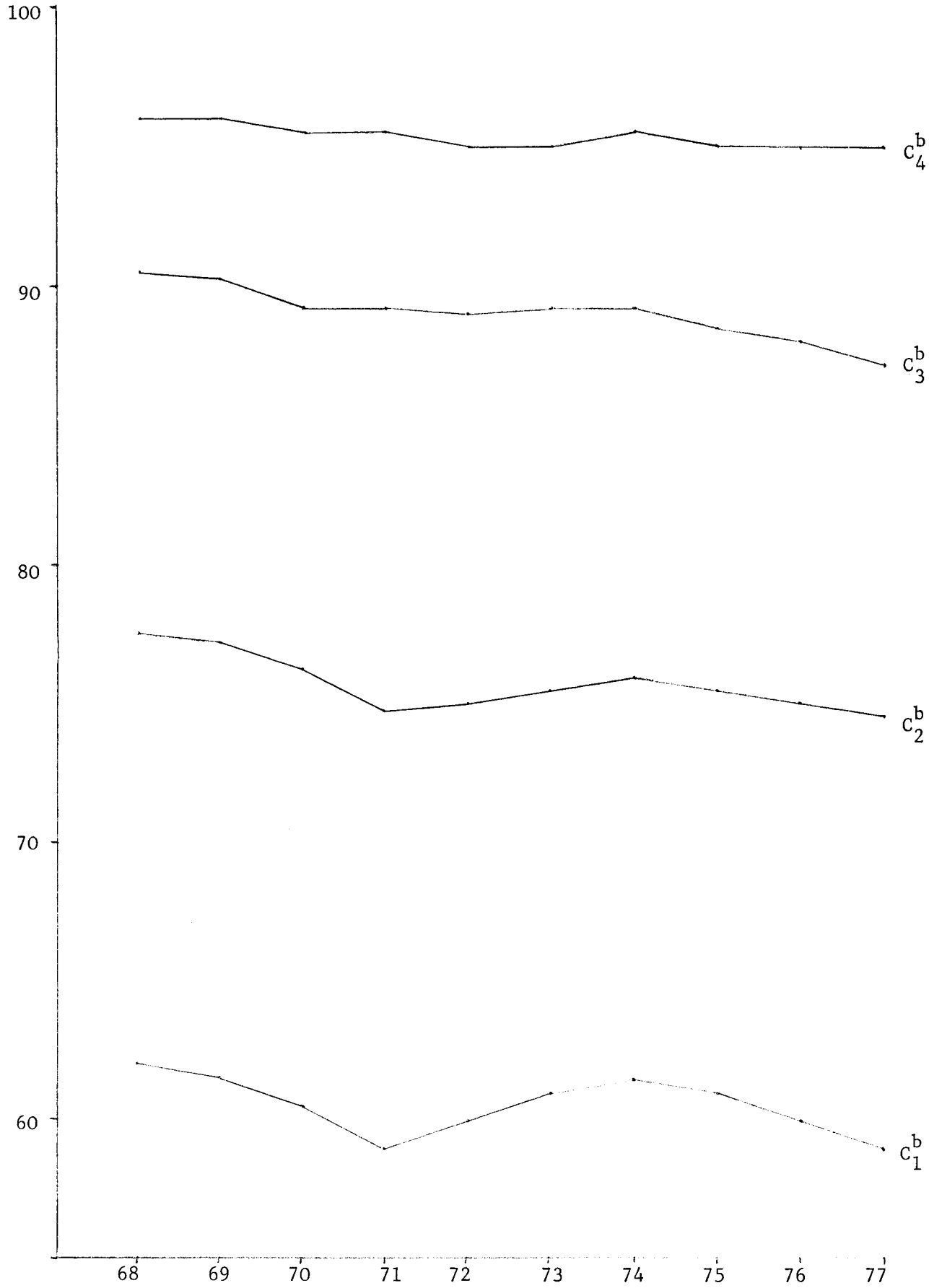


FIGURE 5 : CONCENTRATION RATIOS, 1968-1977

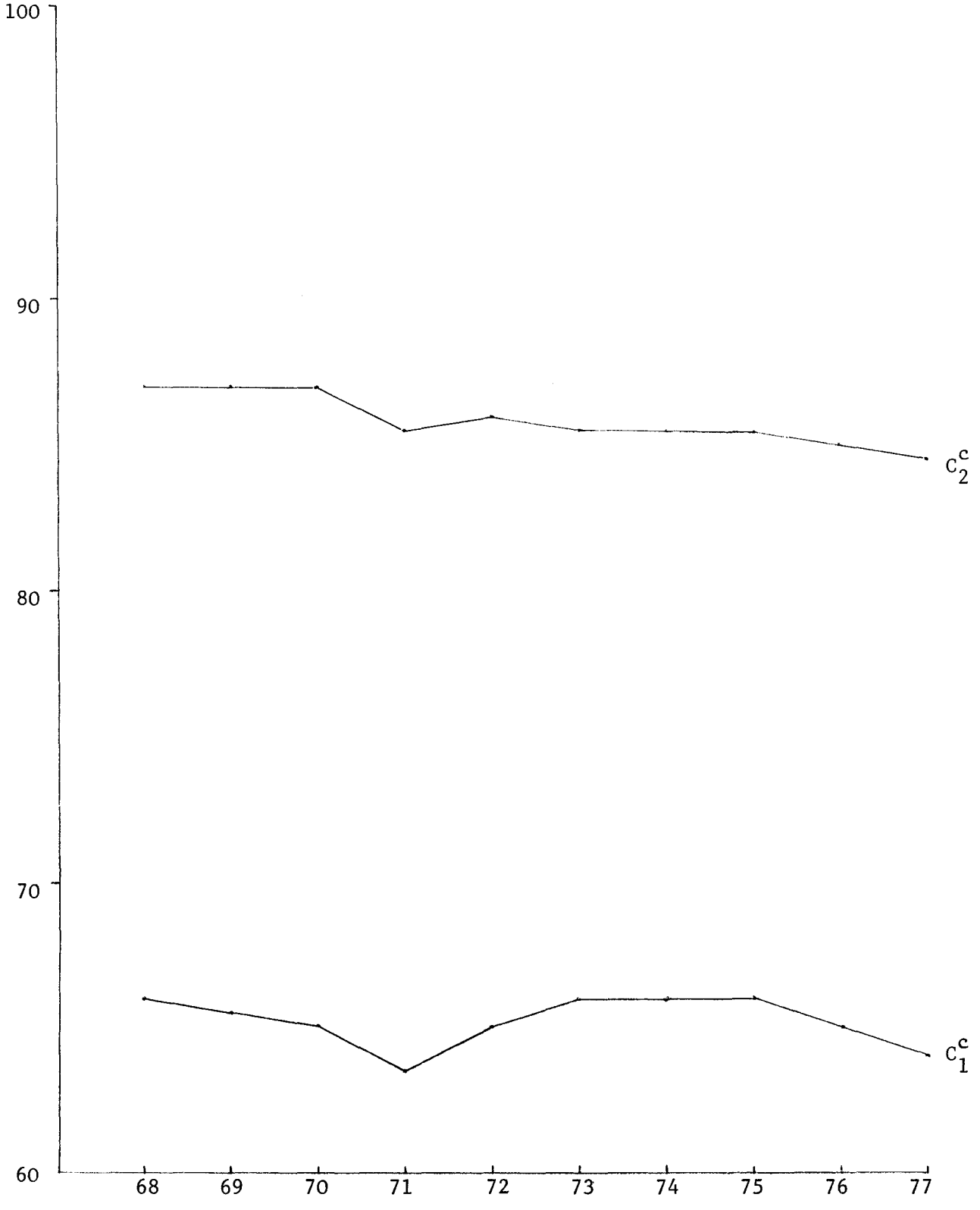


FIGURE 6 : HERFINDAHL INDICES, 1968-1977

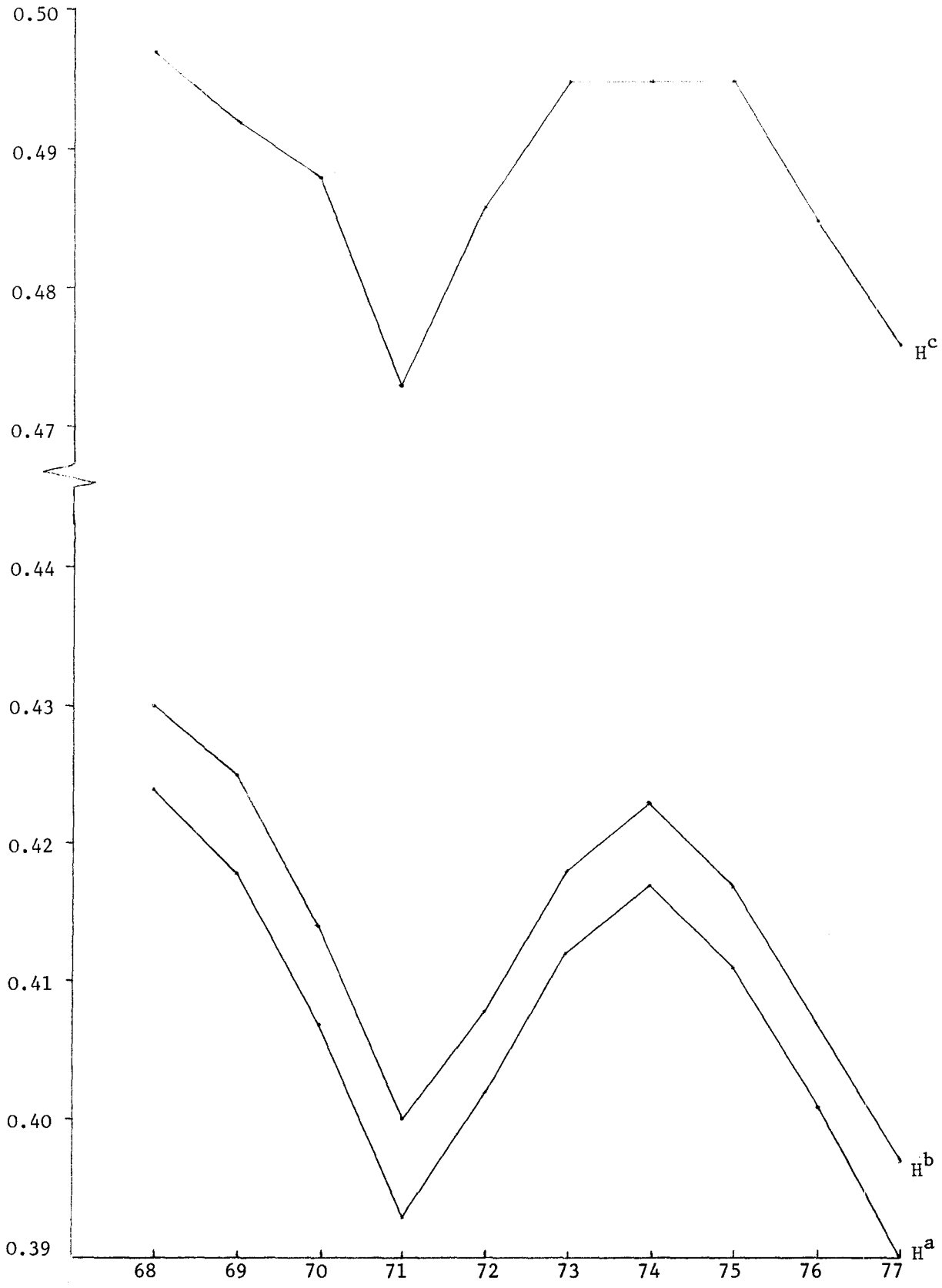


FIGURE 7 : ENTROPY INDICES, 1968-1977

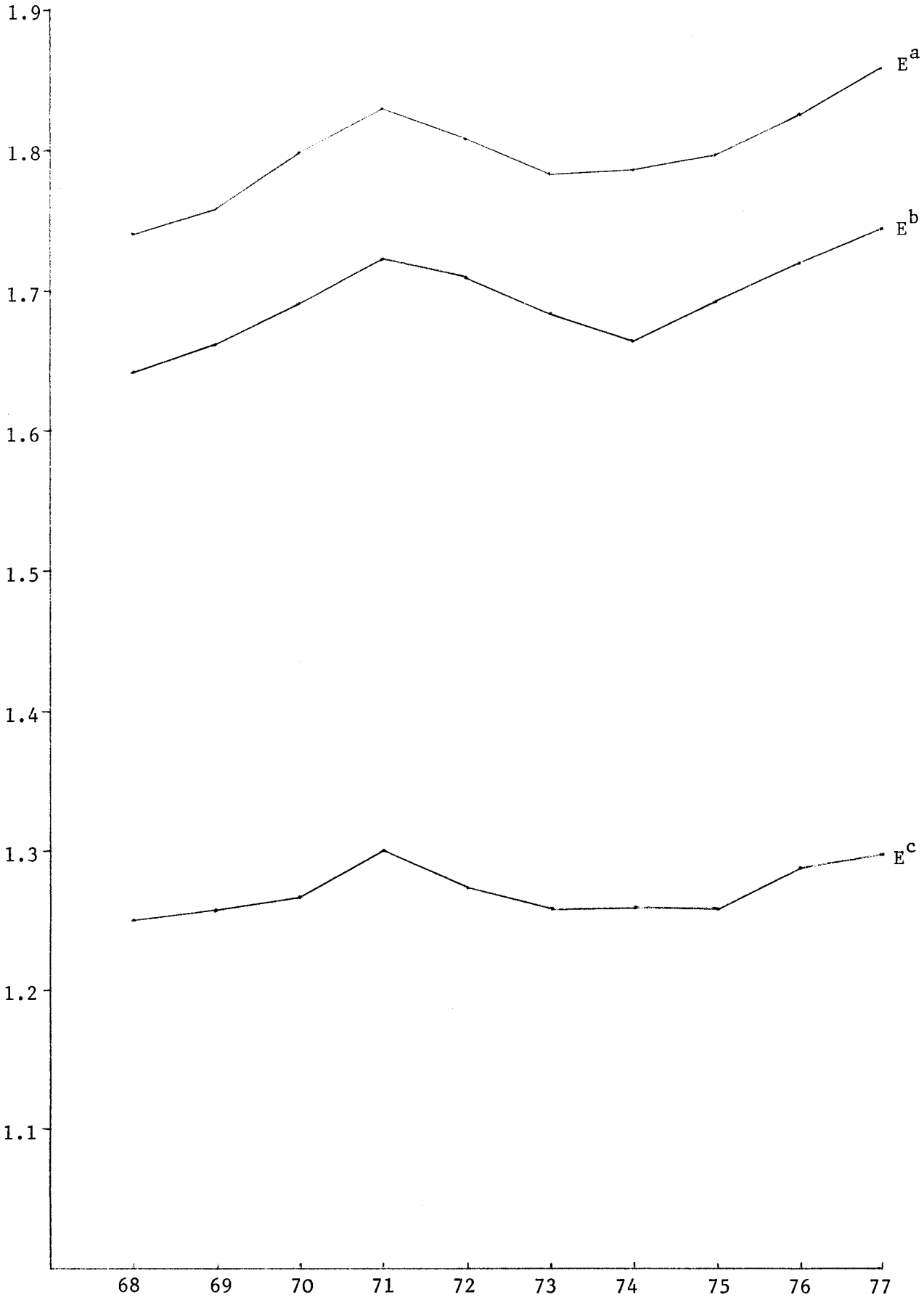


FIGURE 8 : HALL-TIDEMAN INDICES, 1968-1977

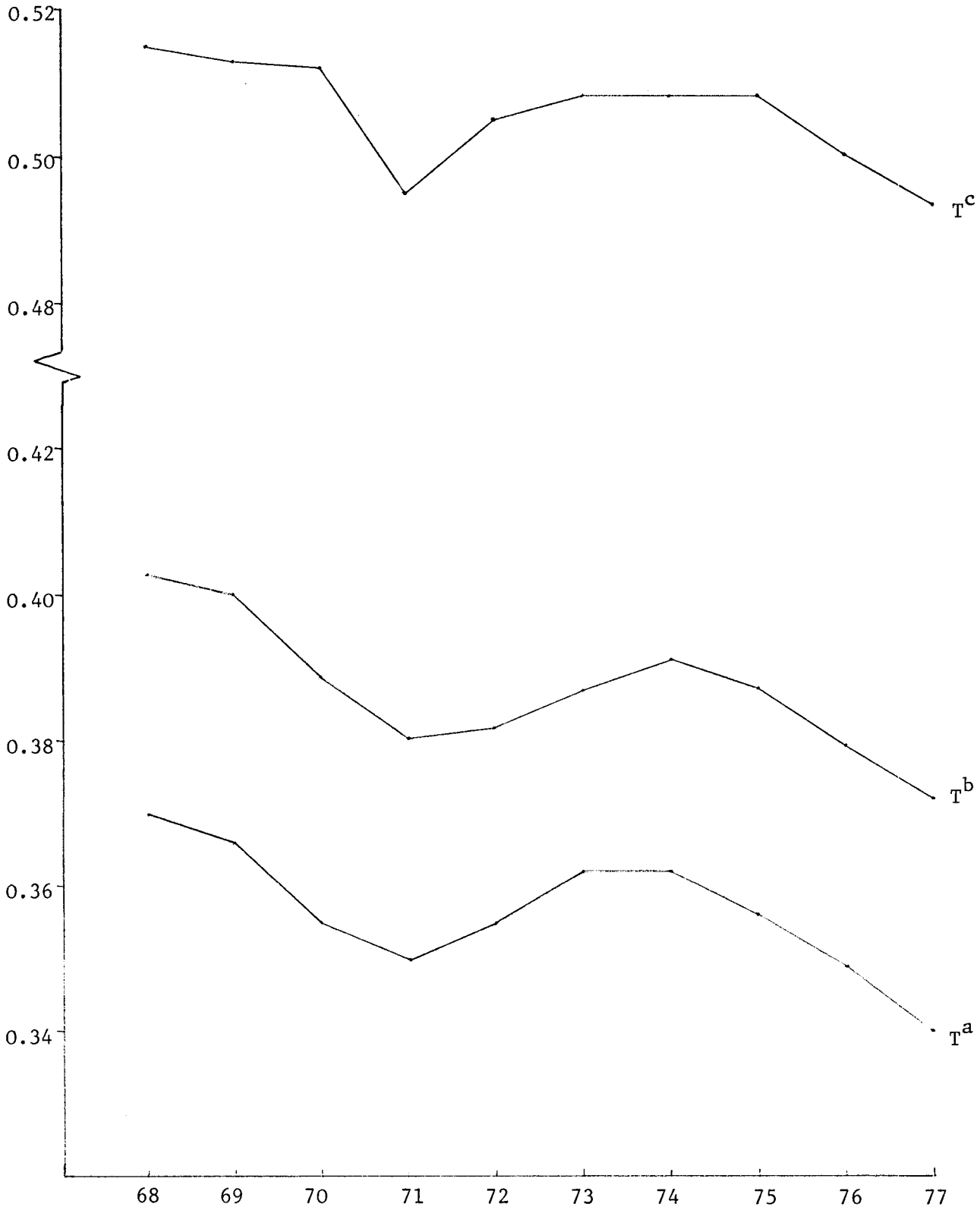


FIGURE 9 : VARIANCE OF LOGARITHMS, 1968-1977

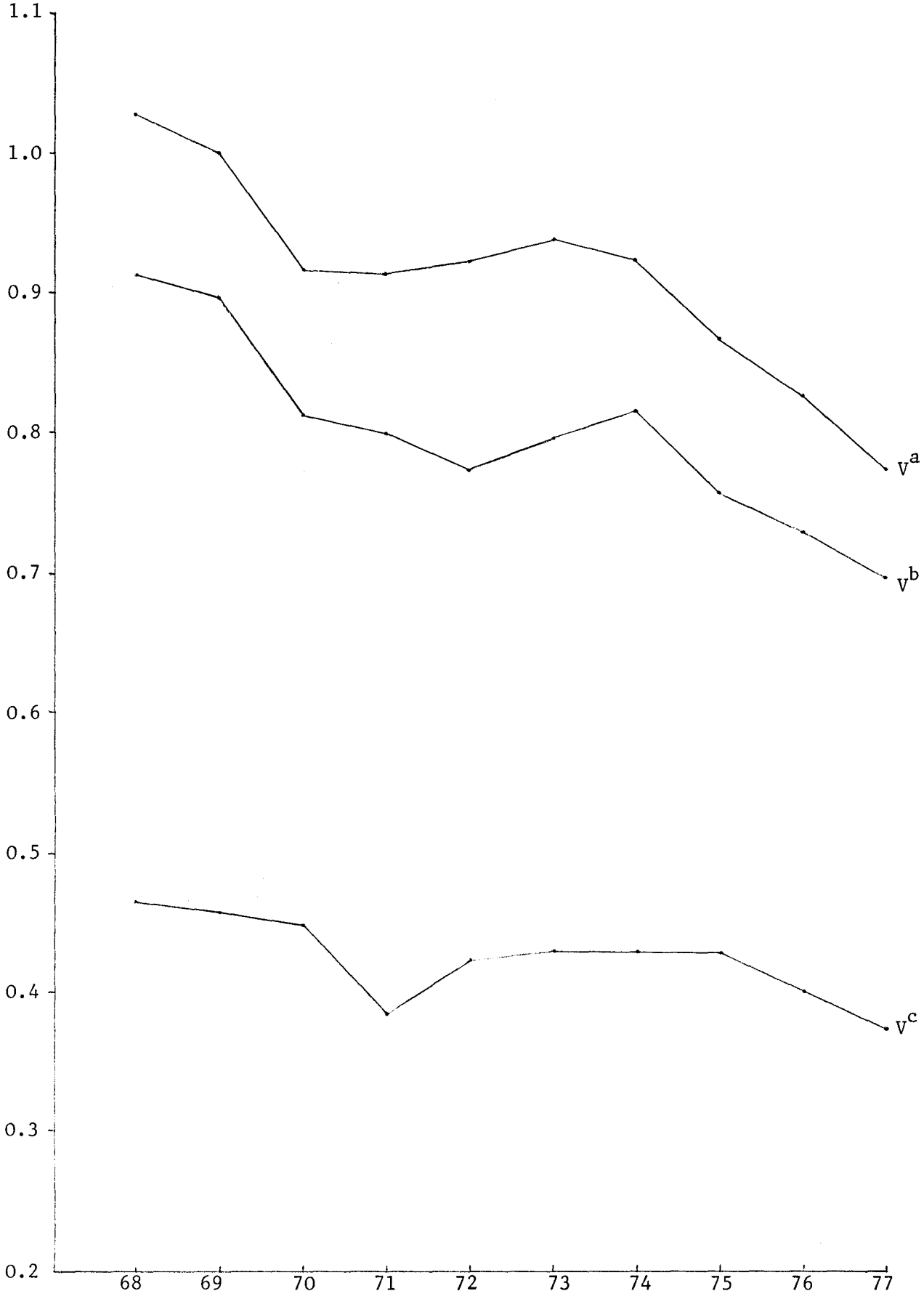


FIGURE 10 : LINDA INDICES , 1968-1977

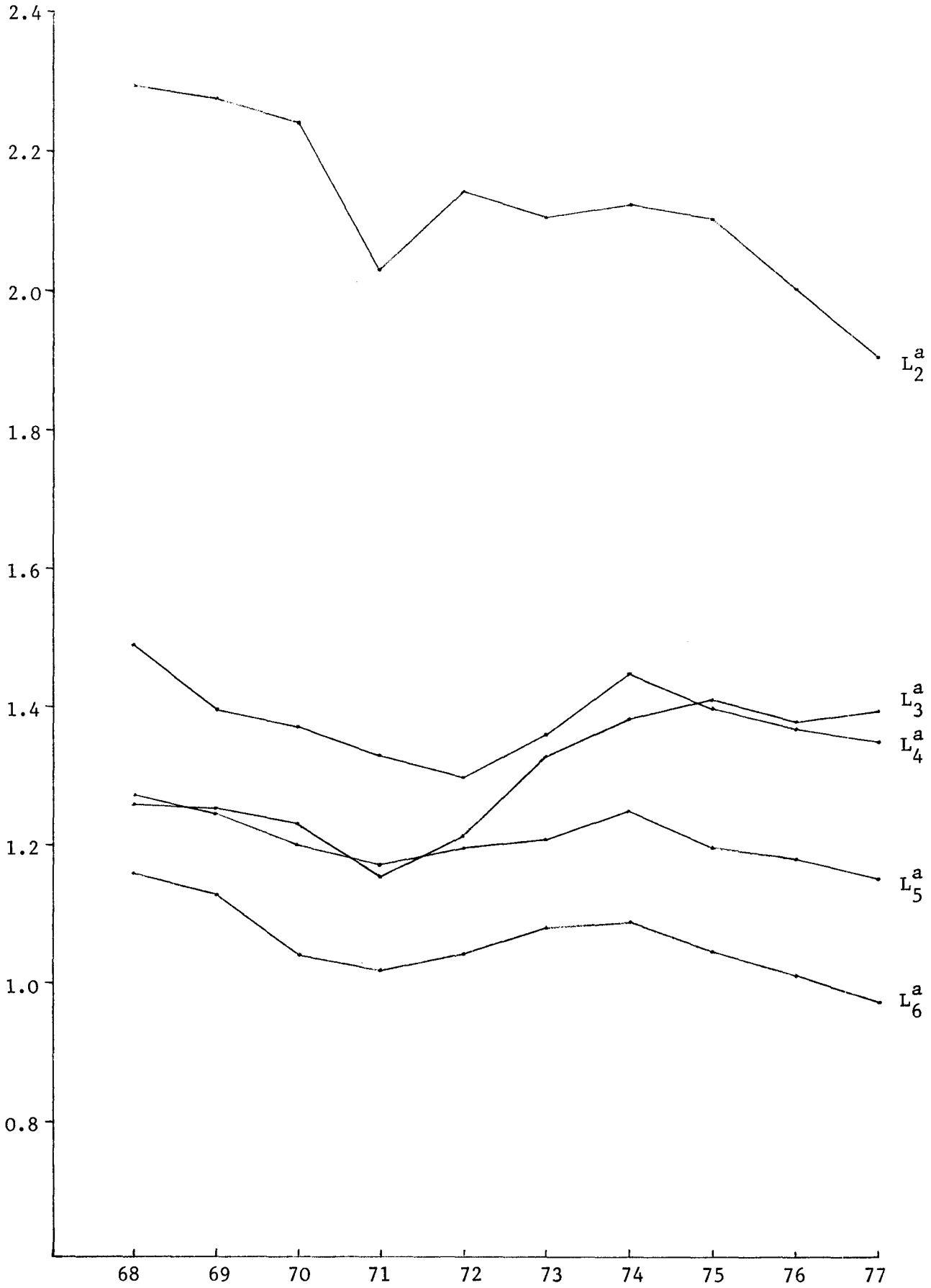


FIGURE 11 : LINDA INDICES, 1968-1977

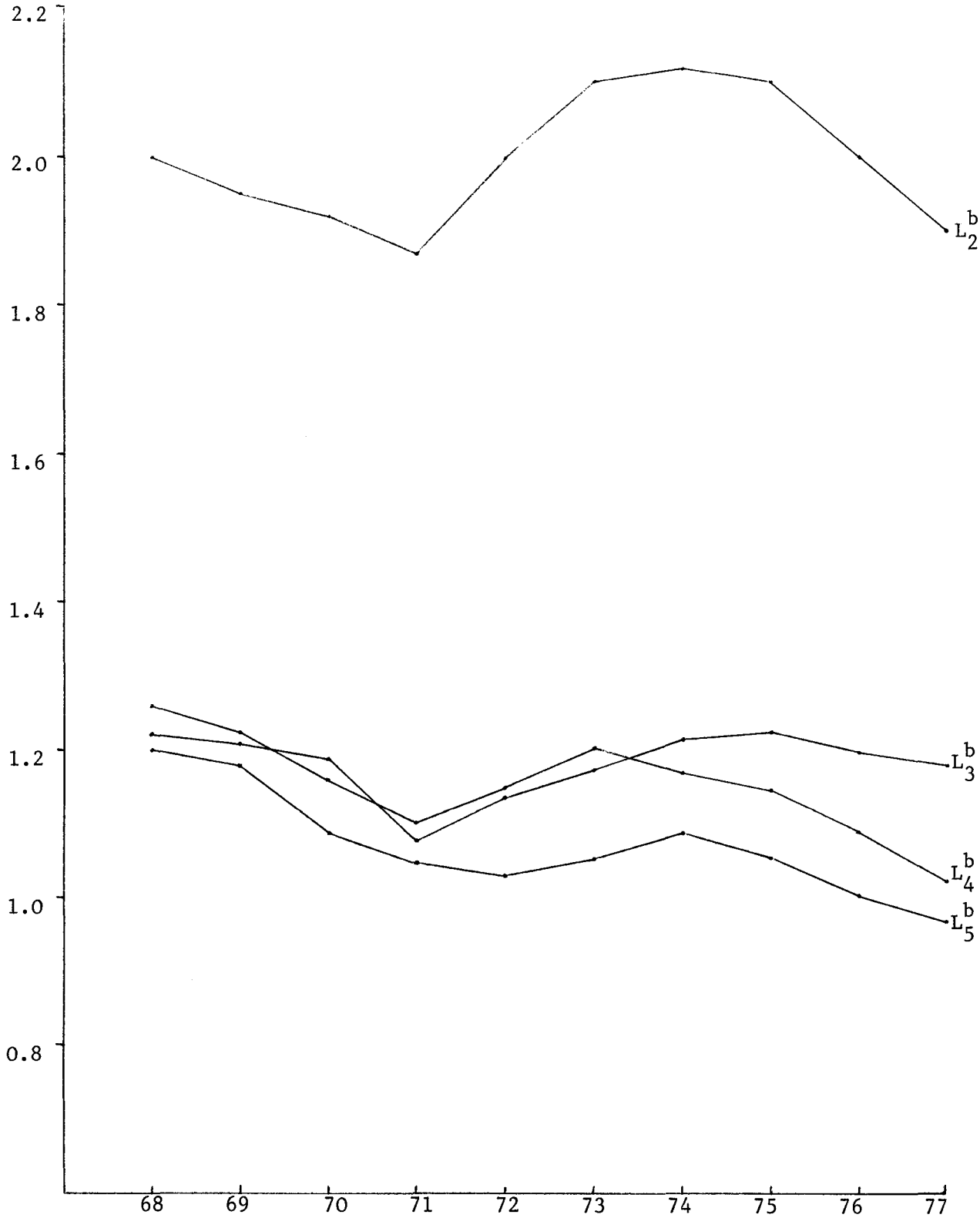


FIGURE 12 : LINDA INDICES, 1968-1977

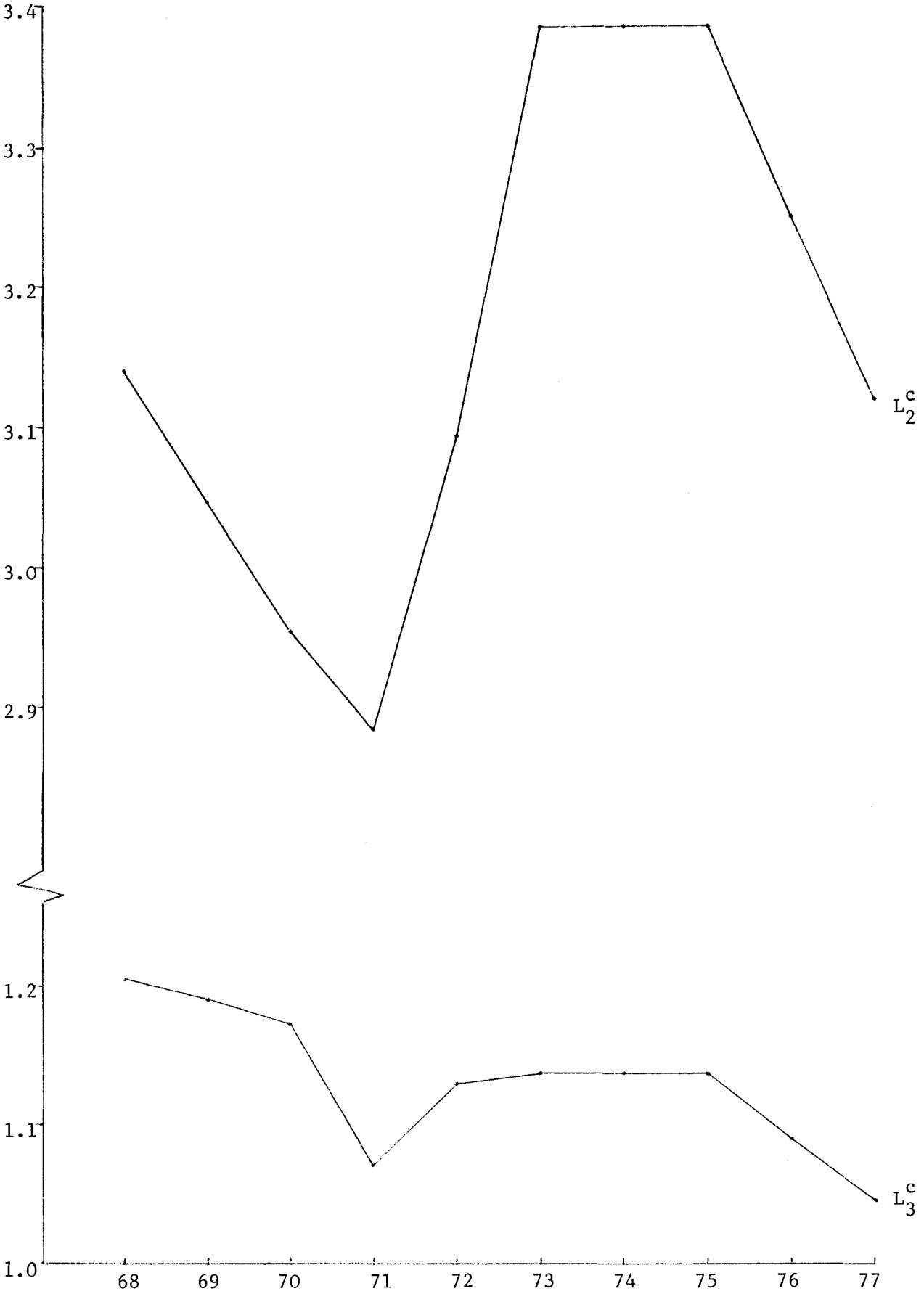
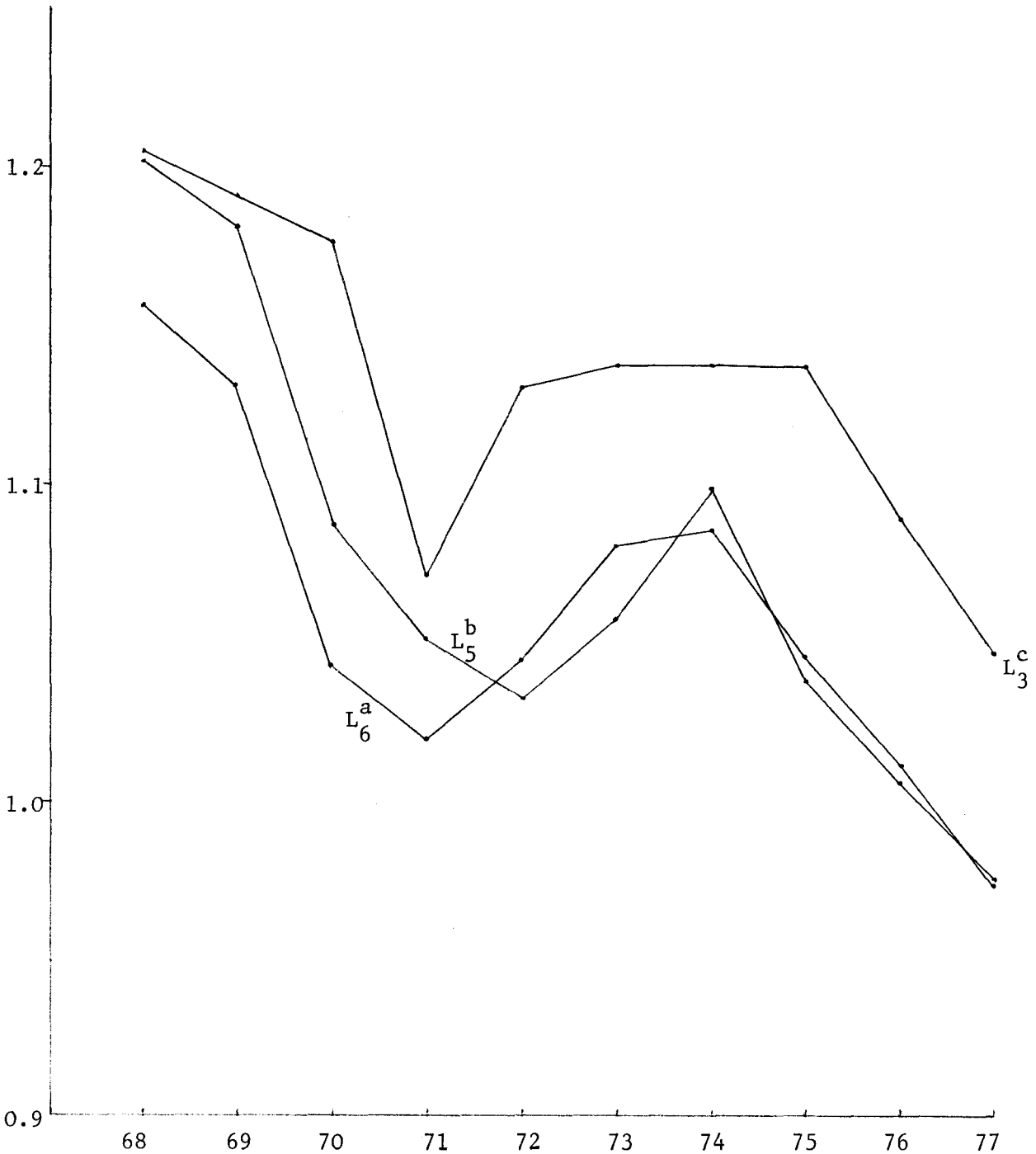


FIGURE 13 : LINDA INDICES, 1968-1977



3. Concentration Movements in Other Variables

It is possible to examine the development of concentration since 1968 using the data published in company accounts. However, in our view, such a procedure is likely to produce misleading results for the following reasons:

(a) some of the firms, particularly the larger ones, have diversified their operations into other industries and overseas production, but the accounts do not generally provide breakdowns of the relevant variables in a form which allows accurate measurement of (UK) cement-specific activities;

(b) accounts for two of the firms in the industry, Ribblesdale and (since 1973) Ketton, are not available since these firms are wholly owned by other companies; and

(c) accounting conventions differ between companies.

It is our judgement that the estimates and approximations made necessary by the use of the published accounting data would introduce measurement errors which were large in relation to the magnitudes of the changes in concentration over the period indicated by the output statistics, and that consequently the results could not be regarded as reliable.

The Cement Makers Federation have, however, made available to us confidential information which they collect in connection with the Common Price Agreement. This information is cement-specific in that the variables concerned relate to the production of the common-price cements (which account for over 90% of deliveries to the UK market). Further, it is collected on a standardised basis for all the firms in the industry and data is available for Ribblesdale and Ketton. The only major disadvantage in using this source is that, because of the confidential nature of the information provided, it is not possible to publish the raw data and, to prevent reconstruction of the raw data from the summary statistics, only a restricted number of concentration indices can be calculated.

Despite this last drawback we have chosen to work with the CMF data in the present chapter since we believe that it yields a very accurate picture of concentration trends in the industry. However, an appendix to the report contains tables showing the magnitudes of the variables under discussion derived from the company accounts, to enable anyone who so wishes to calculate the concentration indices on this alternative, less reliable basis.

The variables to be considered are as follows:

Turnover

Capital employed

Numbers employed

Wages and salaries

Net profit before interest and tax.

In the CMF statistics capital employed is measured on a depreciated replacement basis.

Values of the Herfindahl and Hall-Tideman indices between 1968 and 1976, calculated from the CMF data, are shown in tables 35-44 and are plotted in the accompanying graphs. As in the previous section, a superscript (a) denotes indices calculated from unadjusted data on the six firms operating in the industry, while a superscript (c) indicates a statistic derived from data based on a consolidation of the variables for APCM and Aberthaw, and for Tunnel, Ketton and Ribblesdale. The main features of the results are summarised below.

Turnover

Not surprisingly, the turnover figures yield values of the concentration indices which, on average, are very similar to those obtained for output. However, the cyclical pattern of the results is much less pronounced and the downward trend in concentration shown in the output figures disappears for

turnover. In fact, the trend level of concentration appears to be stationary for three of the indices, while the exception (H^c) actually shows a tendency to increase. The inference suggested by these movements is that, over the period, the average price per tonne of cement has tended to increase slightly more quickly for the larger companies.

Capital Employed

At the beginning of the period, in 1968, capital employed was significantly less concentrated than output or turnover, indicating that APCM's operations were, on average, less capital intensive than those of the smaller companies. Between 1968 and 1971 there was, however, a sharp increase in concentration, with H^a rising from 0.352 to 0.439 (a 25% increase) and T^a from 0.334 to 0.392 (a 17% increase). This movement is probably explained by major new investments at APCM's Northfleet site. From 1971 the unconsolidated data shows a steady fall in the concentration indices, whereas H^c and T^c remain relatively steady until 1975 and then show a marked fall in 1976. The downward movement in concentration since 1971, measured by H^a and T^a, is almost certainly chiefly the result of faster expansion of capacity by the smaller firms. By 1976 the degree of concentration of capital employed was approximately the same as that of turnover and output.

Numbers employed

In 1968 the concentration of employment among the six firms was greater than the concentration of turnover or capital employed. However, all four indices show significant falls over the period so that by 1976 employment was less concentrated than the other variables. The percentage falls in the indices between 1968 and 1977 are as follows:

H^a : 11.4%

T^a : 9.0%

H^c : 5.9%

T^c : 6.0%

Substitution of capital for labour has thus been proceeding less quickly among the smaller firms.

Wages and salaries

H^a and T^a show that wages and salaries have, on average, had approximately the same degree of concentration over the period as numbers employed. The values of H^c and T^c are, however, slightly higher than the corresponding magnitudes for employment. All four concentration indices show a strong downward movement from 1968 to 1978, the percentage falls being as follows:

H^a : 15.1%

T^a : 12.4%

H^c : 9.1%

T^c : 7.2%

Net profit

A major problem occurs in using net profit figures to calculate concentration indices whenever a firm makes losses. To overcome this difficulty the arbitrary convention of treating a loss as zero profit has been adopted.

It can be seen from the table and graph that the concentration indices for net profit move extremely erratically, although their average values tend to be higher than those for the other variables. That is, profit appears to be more concentrated than output, turnover, capital employed,

numbers employed and wages and salaries. Because of the fluctuations, it is difficult to detect significant trends in the indices, although the least erratic series (for T^a) does show a definite upward movement suggesting that the smaller companies such as Aberthaw, Ketton and Ribblesdale have been increasing their shares of industry profit.

Conclusions

The trends in concentration of the variables analysed can be summarised in the following way:

Turnover - relatively little change over the period.

Capital employed - a sharp rise between 1968-71 and then (a) a tendency to fall for measures based on the unadjusted data, and (b) little trend in the indices calculated from aggregated market shares.

Numbers employed - downward trends in all the indices.

Wages and salaries - particularly strong downward trends in all the indices.

Net profit - unclear results because of the sharp year-to-year variations in the variable.

4. A further note on ownership considerations

It was stressed earlier that the concentration indices should be interpreted in the light of the various ownership and control links between the firms in the industry. To make this easier concentration measures were calculated for differing levels of consolidation of the market share data and, in particular, in the cases indexed by the superscript c the statistics were based upon an aggregation of the relevant variables for APCM and Aberthaw and for Tunnel, Ketton and Ribblesdale. Now while the three latter companies have

had links throughout the period (Ribblesdale being jointly owned by Ketton and Tunnel) it is only since 1973 that Thos. W. Ward has had a major stake in all three companies. Before 1973 the block of shares in Tunnel which T.W. Ward later acquired was held by F.L. Smidth and Co. It might be therefore argued that, from the point of view of ultimate control, there were four major interests in the UK cement industry prior to 1973, and not three as assumed in the earlier analysis. It would clearly be straightforward, though tedious, to calculate the values of the various concentration indices for this fourth (and any other) possible consolidation of the data. However, the principal implication of this alternative view of the problem are fairly obvious and can be illustrated via a single example.

Thus, the table below shows market shares for Portland Cement output when Tunnel and 50% of Ribblesdale are assigned to F.L. Smidth prior to 1973 and to T.W. Ward from 1973 onwards.

Table 34

Year	APCM	Rugby	T.W. Ward	F.L.Smidth	H^d
1968	66.0	13.0	5.50	15.50	0.480
1969	65.5	13.0	5.75	15.75	0.474
1970	65.0	13.0	6.25	15.75	0.468
1971	63.5	14.5	6.25	15.75	0.453
1972	65.0	14.0	6.00	15.00	0.468
1973	66.0	14.5	19.50	0	0.495
1974	66.0	14.5	19.50	0	0.495
1975	66.0	14.5	19.50	0	0.495
1976	65.0	15.0	20.00	0	0.485
1977	64.0	15.5	20.50	0	0.476

The final column of the table shows the values of the Herfindahl index for the data in the table. The index is also plotted in the accompanying graph. Comparing the results with those obtained earlier it can be seen that the

major effect of the change in aggregation is to produce a much greater increase in concentration between 1972 and 1973 as a consequence of the extension of Ward's interest in the industry in the latter year. Similar results would also clearly follow for other concentration ratios and other variables, tending to attenuate or reverse downward trends where they appear in the series and to strengthen upward trends.

FIGURE 14 : ADJUSTED OUTPUT, 1968-1977

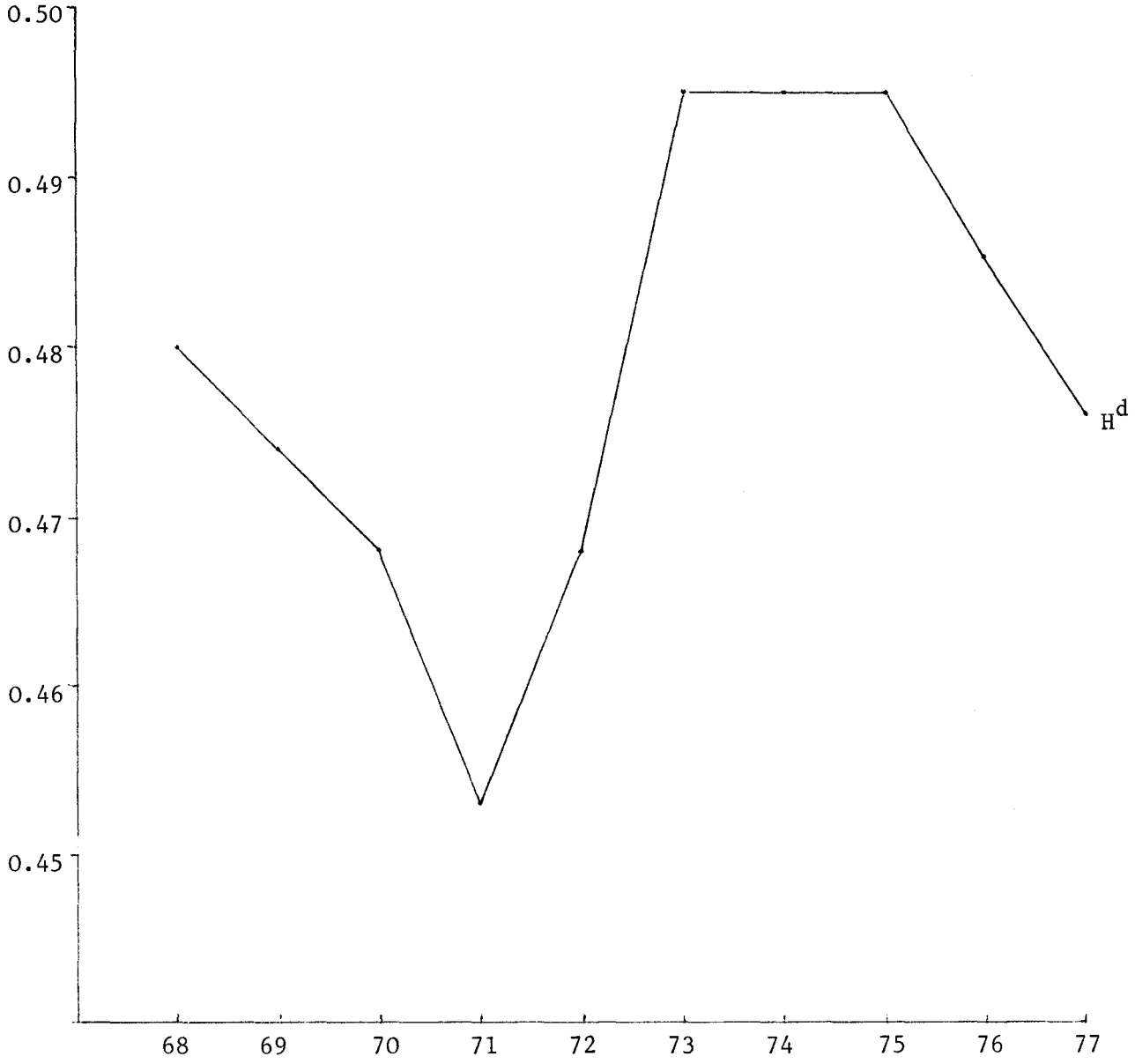


Table 35 Herfindahl Indices for Turnover

Year	H^a	H^c
1968	0.416	0.489
1969	0.412	0.488
1970	0.399	0.481
1971	0.382	0.466
1972	0.399	0.482
1973	0.410	0.493
1974	0.410	0.492
1975	0.418	0.502
1976	0.406	0.492

Table 36 Hall-Tideman Indices for Turnover

Year	T^a	T^c
1968	0.366	0.509
1969	0.361	0.510
1970	0.351	0.504
1971	0.342	0.491
1972	0.356	0.503
1973	0.360	0.506
1974	0.359	0.505
1975	0.361	0.512
1976	0.357	0.504

Table 37 Herfindahl Indices for Capital Employed

Year	H^a	H^c
1968	0.352	0.432
1969	0.393	0.460
1970	0.430	0.492
1971	0.439	0.501
1972	0.420	0.494
1973	0.418	0.493
1974	0.416	0.498
1975	0.418	0.504
1976	0.398	0.483

Table 38 Hall-Tideman Indices for Capital Employed

Year	T^a	T^c
1968	0.334	0.467
1969	0.359	0.487
1970	0.383	0.513
1971	0.392	0.522
1972	0.369	0.517
1973	0.361	0.516
1974	0.357	0.519
1975	0.360	0.525
1976	0.347	0.506

Table 39 Herfindahl Indices for Numbers Employed

Year	H^a	H^c
1968	0.421	0.489
1969	0.423	0.491
1970		
1971		
1972		
1973	0.403	0.478
1974	0.391	0.469
1975	0.393	0.472
1976	0.389	0.488
1977	0.373	0.460

Table 40 Hall-Tideman Indices for Numbers Employed

Year	T^a	T^c
1968	0.377	0.503
1969	0.379	0.504
1970		
1971		
1972		
1973	0.364	0.496
1974	0.357	0.489
1975	0.358	0.489
1976	0.347	0.490
1977	0.343	0.473

Table 41 Herfindahl Indices for Wages and Salaries

Year	H^a	H^c
1968	0.449	0.530
1969	0.440	0.523
1970	0.400	0.503
1971	0.392	0.484
1972	0.390	0.489
1973	0.406	0.500
1974	0.381	0.479
1975	0.391	0.491
1976	0.381	0.482

Table 42 Hall-Tideman Indices for Wages and Salaries

Year	T^a	T^c
1968	0.388	0.539
1969	0.383	0.534
1970	0.366	0.518
1971	0.352	0.502
1972	0.350	0.507
1973	0.359	0.514
1974	0.345	0.505
1975	0.343	0.511
1976	0.340	0.500

Table 43 Herfindahl Indices for Net Profit

Year	H^a	H^c
1968	0.422	0.502
1969	0.447	0.598
1970	0.493	0.597
1971	0.442	0.503
1972	0.452	0.524
1973	0.512	0.576
1974	0.385	0.425
1975	0.492	0.569
1976	0.493	0.555

Table 44 Hall-Tideman Indices for Net Profit

Year	T^a	T^c
1968	0.363	0.518
1969	0.429	0.629
1970	0.413	0.598
1971	0.402	0.510
1972	0.415	0.532
1973	0.461	0.571
1974	0.404	0.603
1975	0.447	0.559
1976	0.476	0.685

FIGURE 15 : HERFINDAHL AND HALL-TIDEMAN INDICES FOR TURNOVER, 1968--1976

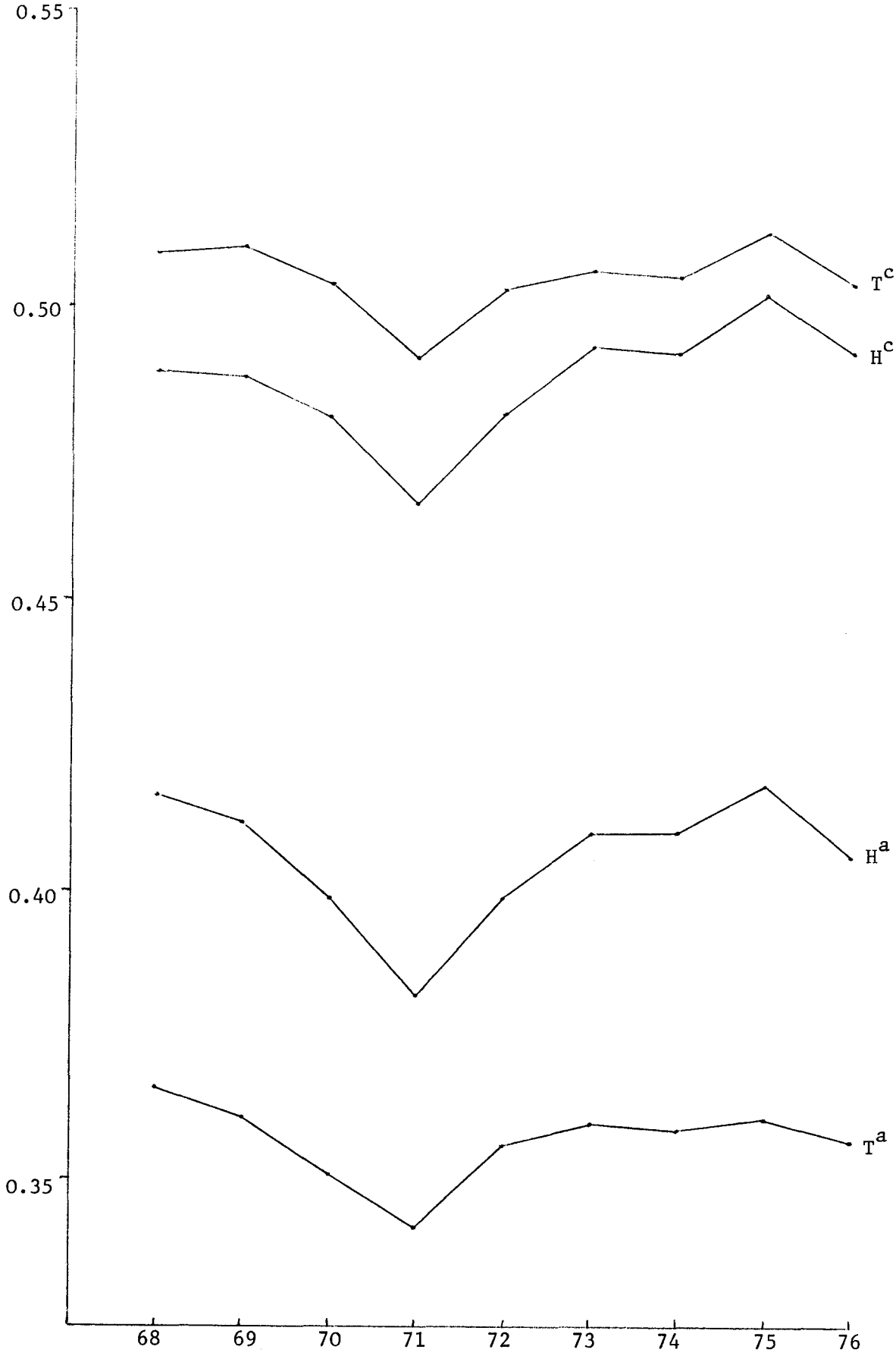


FIGURE 16: HERFINDAHL AND HALL-TIDEMAN INDICES FOR CAPITAL EMPLOYED, 1968-1976

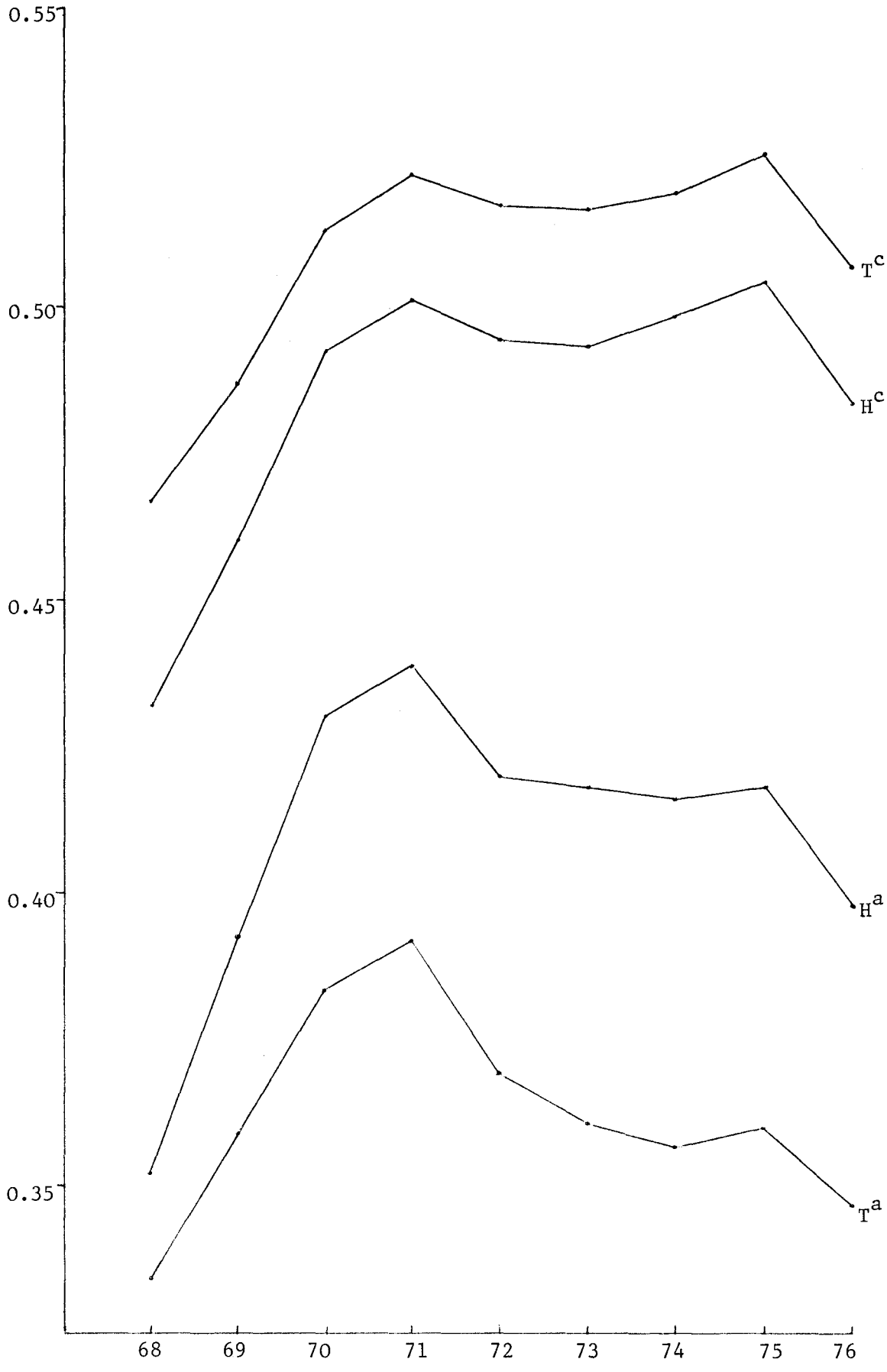


FIGURE 17: HERFINDAHL AND HALL-TIDEMAN INDICES FOR NUMBERS EMPLOYED, 1968, 1969, 1973-1977

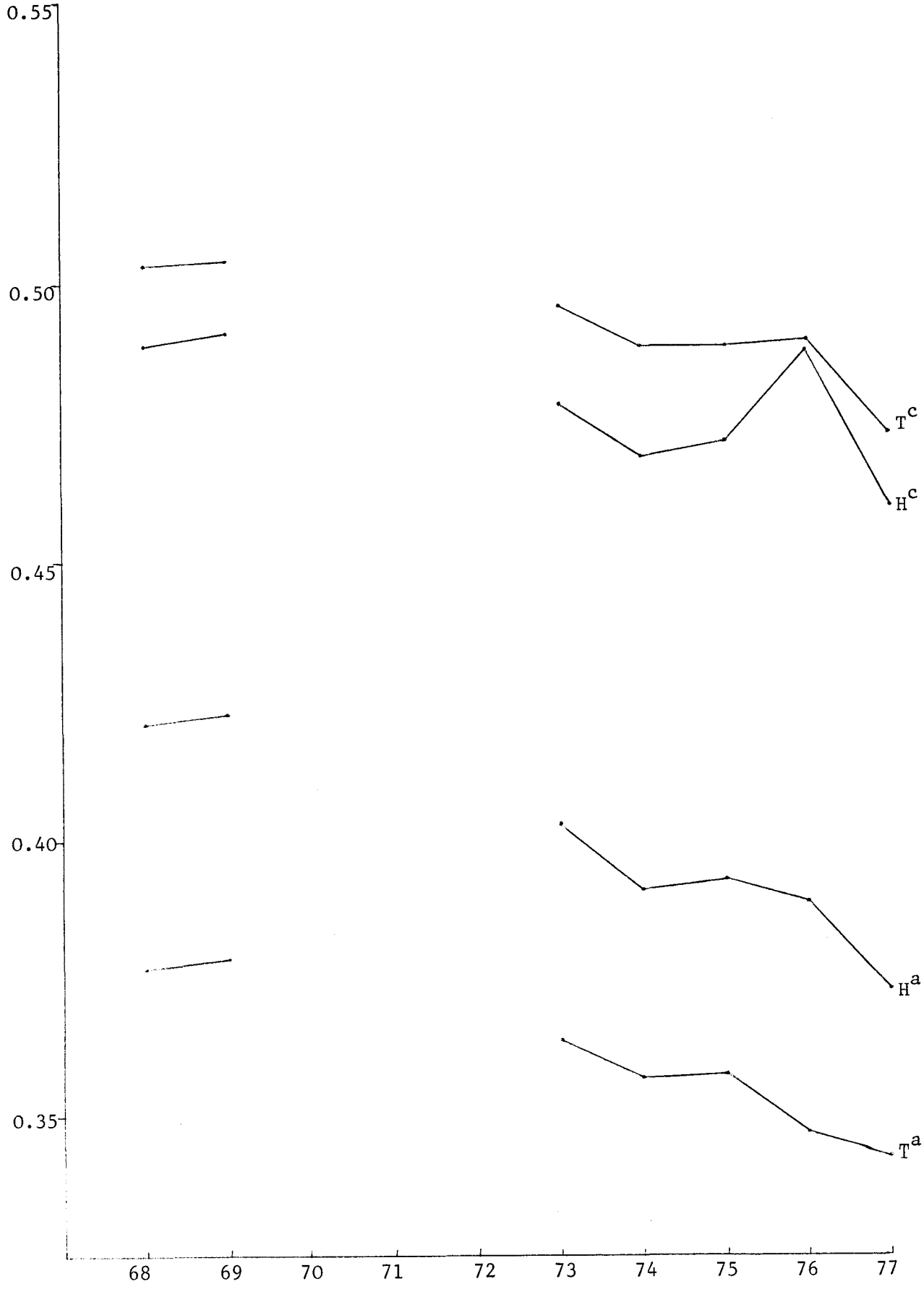


FIGURE 18: HERFINDAHL AND HALL-TIDEMAN INDICES FOR WAGES AND SALARIES, 1968-1976

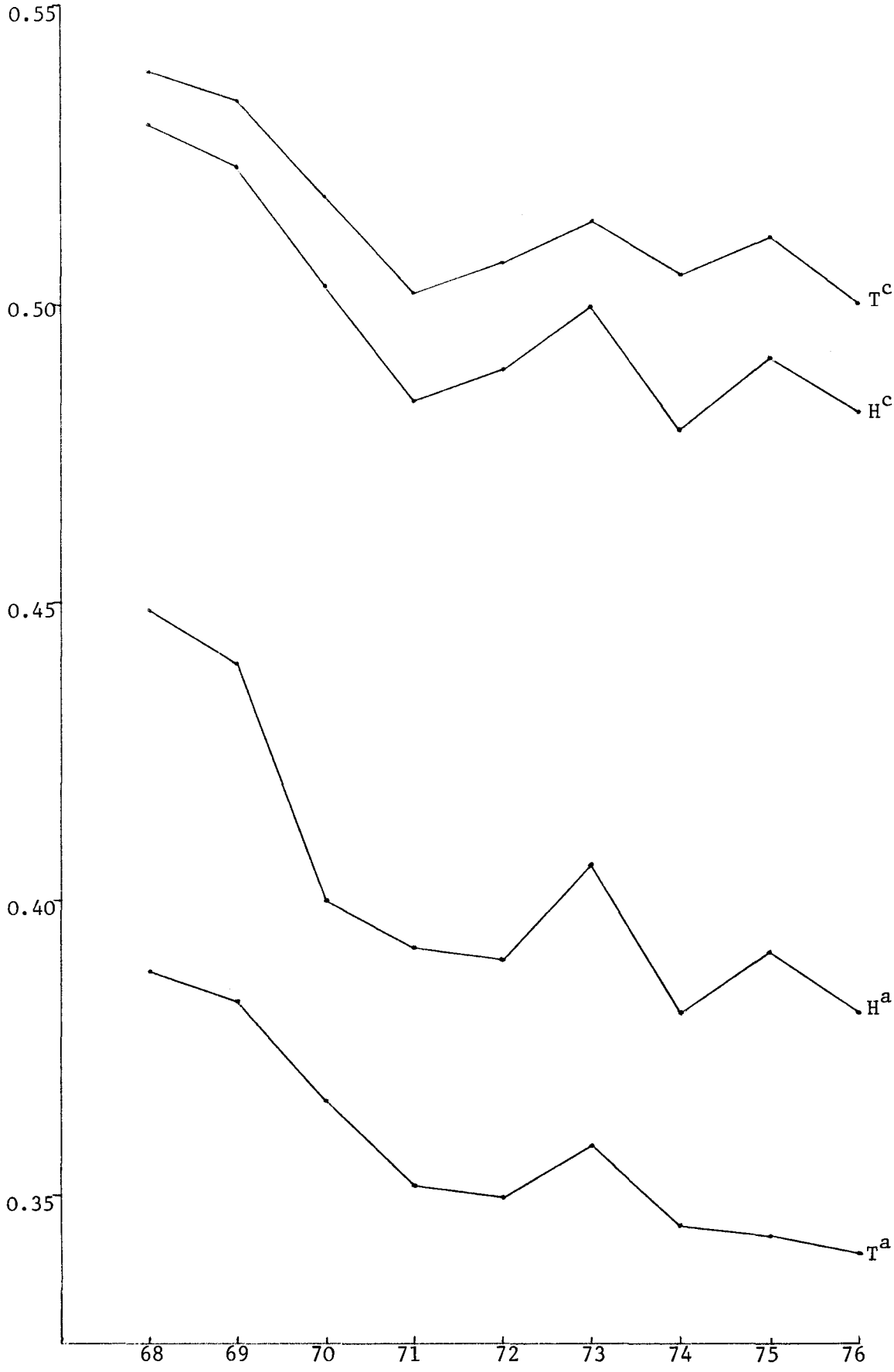
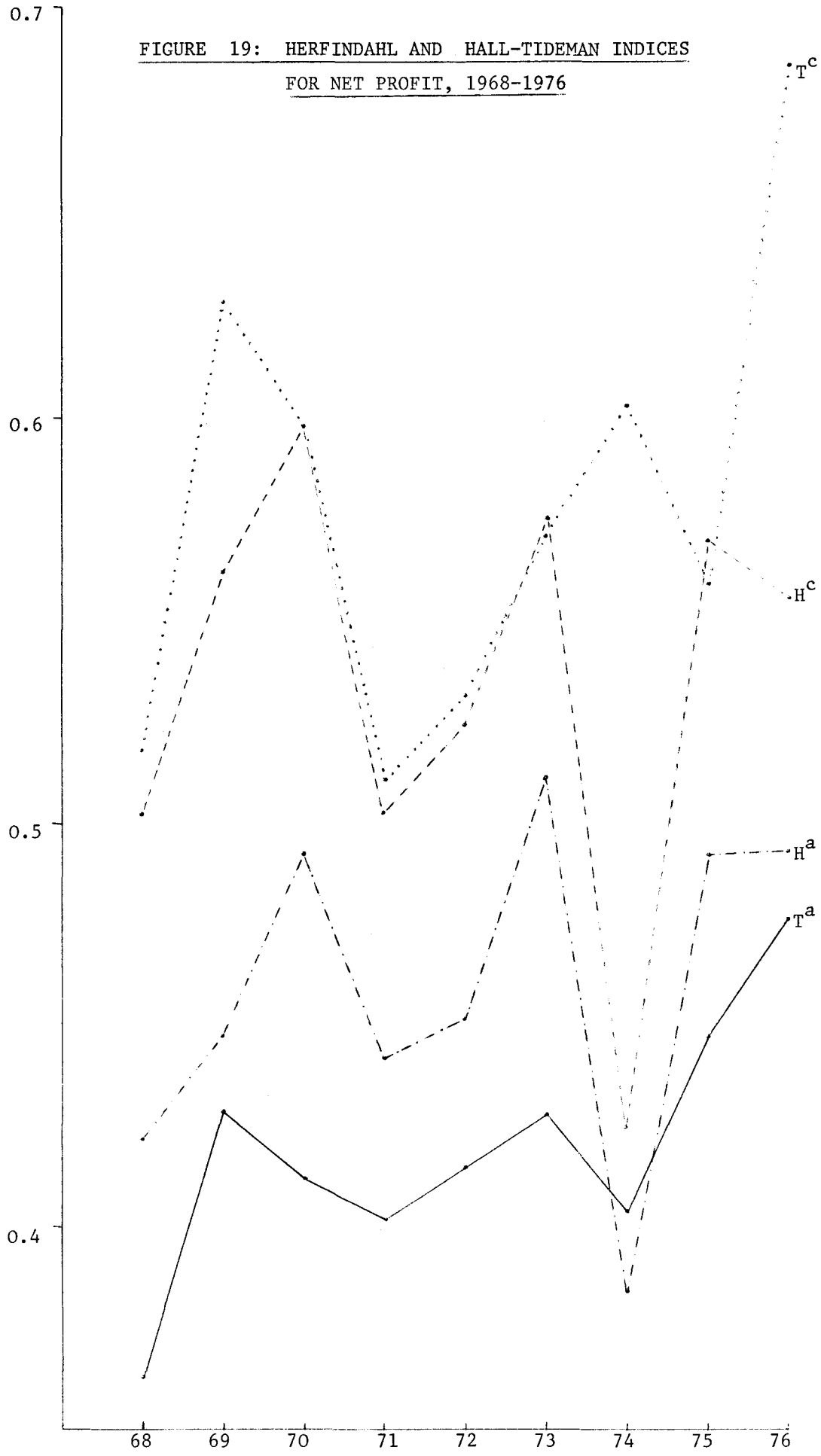


FIGURE 19: HERFINDAHL AND HALL-TIDEMAN INDICES FOR NET PROFIT, 1968-1976



Chapter 6 THE COMMON PRICE AND MARKETING AGREEMENT

1. The Cement Makers' Federation and its Arrangements

The six companies which both manufacture and market Portland cement are members of the Cement Makers' Federation (CMF). ICI, which markets its cement through APCM, is not a member of CMF. The CMF was formed in 1918 but assumed its control over the price of cement manufactured in the United Kingdom in 1934.

The explicit objectives of the CMF include the arranging of reasonable prices and terms for the sale of cement manufactured by members. In this regard, the CMF acts by resolution of its members, whose voting power is calculated upon a system based on, but not directly proportionate to, their annual deliveries in the United Kingdom. The voting rights are adjusted to reduce the voting power of APCM and other restrictions ensure that APCM, despite its preponderant position in the industry, cannot control the policy of the CMF. The CMF passed resolutions establishing common price and marketing agreements in 1934, and these, with minor adjustments, remain operative at the preset time. They constitute a voluntary agreement and, although they are expressed as continuing for an indefinite period, members are at liberty to withdraw at any time by giving notice to the CMF. The arrangements impose no legal obligations and carry no penalites for failure to comply with any of them.

The current arrangements are contained in a volume known as the 'White Book', the latest of which is dated 4 May 1976, and applies only to grey Portland cements manufactured to British Standard specification's numbers 12, 146 and 1370, namely Portland cement (ordinary and rapid hardening), Portland blast-furnace cement and low heat Portland cement respectively.

The main restriction is in the following terms:

"Each member of the Federation will individually specify as the current prices for its cement the prices contained in the current price schedules issued by the Federation, allowing the margins provided by these arrangements to those buyers of cement who become entitled to them in accordance with the conditions upon which such margins are declared to be payable. In respect of cement supplied for re-sale, each member will ensure as a condition of sale that such cement shall not be re-sold at prices greater than those operating on the date of despatch to the customer and will individually enforce such condition by means of any lawful remedy available to it either under Section 25 of the Restrictive Practices Act 1956 or otherwise."

Subsequent provisions of the White Book specify:

(a) the special terms for particular categories of users, at this stage restricted to cement asbestos manufacturers;

(b) details of merchants' margins and the basis for defining recognised builders' merchants;

(c) standard terms of quotations and contracts which provide that deliveries should be made at the price current on the actual date of delivery and quality shall be to the current British Standard specifications;

(d) haulage contractors nominated by cement buyers will not be employed;

(e) merchants' or users' lorries may be hired when no other haulage is available but haulage charges in excess of rates current in the district will not be paid;

(f) depots will not be established on users' premises or for the purpose of supplying cement to individual contracts;

(g) members' depots will not be established in merchants', haulage contractors' or concrete product makers' premises; and

(h) rent will not be paid to users or merchants for signs, display materials or advertising on their premises and agents' or commission agents will not be appointed.

In 1947, the Fforde Committee, which had been appointed by the Minister of Works to examine the price structure of the industry, reported that in their view the prices fixed up to that date had not been unreasonable, but recommended improvements in the method of fixing prices. In consequence, the CMF appointed an independent costs committee consisting of the then independent chairman of the CMF and the independent accountant. This committee worked with a representative of the Minister of Works until government control was withdrawn

in 1951. Since that date, Sir William Slimmings has acted continuously as Independent Accountant. Currently, the second member of the committee is also Chairman of the Cement and Concrete Association. The independent costs committee inherited, and has continued to approve, a price structure built up on 'Basing Points' and distance zones. It keeps under regular review the costs and profits of the industry, receiving each quarter from each member the particulars of that member's production, despatches and deliveries, net proceeds of sale, and his costs of manufacture and delivery, analysed under a number of headings.

From these returns, each individual member's performance is analysed on a per tonne basis, before the committee decides whether the costs properly can be averaged to form an estimate for the industry as a whole. The committee is empowered to exclude from the weighted average such returns as they regard to be untypical. This power is rarely exercised in practice. The weighted average costs and results for the whole industry for the quarter and for the preceding 12 months then are circulated to all members. If the committee or any member of the CMF considers that a change in prices is necessary to maintain the overall profits of the industry at a reasonable level, a meeting is held of the council of the CMF under the chairmanship of the independent chairman and attended by the independent accountant. The two latter have no vote upon any resolution as to prices, but indicate their views as to present and future trends of costs and of demands.

In addition to the quarterly reviews, the independent costs committee is involved in the setting of a 'base price' and 'distance zones' for all new works which come into operation. In general, an attempt is made to fix a base price which will induce a reasonable rate of return on capital, bearing in mind market conditions. The 'base price' of a new works must not exceed the current price, based on a 'distance zone' from some existing

works, at the location of the new works. Finally, the committee periodically initiates, at its own discretion, a general review of base prices and distance zone increments throughout the country.

2. Pricing Policy and the Price Structure

There is no written document which defines the basis on which prices are set by the CMF but there is ample documentation of the pricing procedures adopted in practice since 1934. The CMF fixes both ex-works prices for supplies collected by customers and delivered prices for ordinary, coarse ground and rapid hardening Portland cements. The price structure is built up on 'basing point prices' at works and increments for deliveries to locations within distance rings of works in England, Wales and Northern Ireland and road mileages of works and coastal depots in Scotland. All prices are outlined in a volume entitled 'Price Schedules' distributed by the CMF and detailing the delivered price, exclusive of VAT, for 10 tonne loads of ordinary Portland cement supplied in bulk by road in pressure vehicles for each administrative area in England, place in Scotland, community in Wales and ward in Northern Ireland.

Currently, the CMF has 43 designated 'basing points' in the UK. But 9 are situated at closed works. In March 1978 the location of the points, together with the price ranges for ordinary Portland cement within each area were as outlined in Table 45:

Table 45 Basing Points and Price Ranges in the UK

Area	Number of Basing Points	Basing Point Price per tonne
England and Wales	33	£22.51 - £24.61
Northern Ireland	2	£23 - £39
Scotland	8	£24.56 - £26.90
	43	

(Source: The Price Commission, op.cit.)

Of the 33 points in England and Wales, 20 had a common price of £22.51, 2 a price of £23.12 and the rest ranged up to £24.61. In Scotland, the lowest basing point price was at the only Scottish clinker making works (Dunbar) and the highest is at a depot (Inverness).

Ordinary Portland cement and coarse ground Portland cement are sold at the same price. Rapid hardening Portland cement is sold at a standard premium (currently of £1.33 per tonne) above the ordinary Portland cement price. The selling prices of masonry cement and sulphate resisting Portland cement are not controlled by the CMF. In practice, however, the cement manufacturers systematically relate prices for these products to that of ordinary Portland cement. Masonry cement is sold at the same price (except for Northern Ireland where it is sold at a premium, currently of £1.17 per tonne) and sulphate resisting Portland cement is sold at a premium (currently of £3.50 per tonne). Only APCM produces white cement, although Tunnel used to do so.

The second part of the pricing structure is the zone or distance ring increment. In England and Wales, the zones consist generally of radial distances from 'basing points' of 5 miles. There are exceptions. Zones in Northern Ireland consist of radial distances of 4 miles. In Scotland, increments are based on direct road mileages from 'basing points'. Table 46 outlines the zone price increments over 'basing point' prices and indicates the degree of taper for long distances as at March 1978.

Customers are allowed to collect cement from works or depots. Between 1973 and 1977, about 6 per cent of sales were collected by customers. For collection from works, an allowance (in March 1978 of 74p per tonne) is given if a 10 tonne load is taken in bulk. For collection from depots, an allowance is given only if the depot is designated as a 'basing point'. The collection allowance is reduced (currently to 40p per tonne) for bagged cement in 10 tonne lots. Other variations to schedule prices reflect a

Table 46 Zone Price Increments and Distance Taper

Distance from Basing Point	Price Increment over B.P. Price per zone in pence per tonne
England and Wales	
Up to 4.99 miles	Nil
5 to 19.99 miles	20.7p for each of the 3 zones
20 to 34.99 miles	18.1p for each of the 3 zones
35 miles and over	12.9p
Northern Ireland	
Up to 3.99 miles	Nil
4 to 11.99 miles	25.7p for each of the 3 zones
12 to 19.99 miles	20.6p for each of the 3 zones
20 miles and over	12.9p
Scotland	
Haulage rates determined by the CMF on a mileage basis.	

(Source: The Price Commission, op.cit.)

range of factors, such as whether pressure or non-pressure vehicles are used for bulk deliveries or whether delivery is made by rail. All such variations are determined by the CMF and are governed by the common agreement.

Two discounts are offered. The first is for merchants and varies according to product, delivery point and method. The second discount (of $2\frac{1}{2}$ per cent) is for customers who settle their accounts within one month of the end of the month in which delivery is made. There are no discounts related to size of order or annual off-take either to customers or users.

Approximately 95 per cent of all orders are placed through builders' merchants, even though delivery may be made direct to the user. The position of builders' merchants is regulated by the CMF White Book which

outlines the basic trading relationships between suppliers, customers and users. An approved merchant has a yard, carries appropriate stocks of building materials, handles cement at a minimum rate of 500 tonnes per annum, of which 300 tonnes passes through his yard, but does not engage in building or contracting operations, and is not a user of cement.

One feature of the pricing structure operated by the CMF is that the extra prices charged for delivery in the distance zones are not designed necessarily to recover the full costs incurred. The zone price system (as indeed many other price systems operated in the absence of cartelisation) may well give rise to cross-subsidisation in distribution and transportation. Evidence of such cross-subsidisation in the case of APCM was compiled by The Price Commission in its 1978 investigation. It is reproduced here as Table 47:

Table 47 Zone Prices and Cross-Subsidisation

	1973 £m	1974 £m	1975 £m	1976 £m	1977 £m
Total cost of distribution	18.9	20.5	24.4	27.9	30.5
Cost recovered in pricing structure	6.4	6.4	8.8	9.8	10.5
Net subsidy	12.5	14.1	16.6	18.1	20.0
Net subsidy as % of:-					
- distribution cost	66	69	65	65	66
- sales revenue	11	13	11	11	11
Net subsidy in:-					
- £'s per tonne	1.02	1.30	1.61	1.94	2.36
- index (£ per tonne)	100	127	158	190	231

3. The Restrictive Practices Court and the Cement Agreements (1961)

Restrictive agreements such as those operated by the CMF became susceptible to investigation by The Monopolies Commission under The Monopolies and Restrictive Practices Act (1948) following a reference from the Government. In fact, no such reference was made in the case of the supply of cement products. In 1956, British antitrust policy was tightened, in the light of the early reports of the Monopolies Commission, and the burden of proof was shifted against those who maintained restrictive agreements in the supply of goods. To this end, The Restrictive Practices Act (1956) established a Restrictive Practices Court and a Registrar of Restrictive Practices who was empowered to refer restrictive agreements in the supply of goods for the adjudication of the Court. Since the CMF agreement was referred to the Court in 1957, and a Judgment was delivered in 1961, it is necessary to outline briefly the essence of the 1956 Act before reviewing the Judgment of the Court.

The Court was required to decide whether restrictive agreements referred to it by The Registrar should be allowed to continue. There is a presumption in the Act that such agreements are contrary to the public interest and should not be allowed to continue. But the Court has power under Section 21 of the Act to grant what is in effect a licence where an agreement can be shown to satisfy two conditions: first, that it serves the public interest in certain specific ways, and second that its merits in this respect outweigh any detriments which flow from the agreement.

(a) The Gateway Provisions

Section 21(1) of the 1956 Act (subsequently extended and consolidated as Section 19(1) of The Restrictive Trade Practices Act (1976)) specified that restrictive agreements should be deemed to be contrary to the public

interest unless the Court was satisfied of any one or more of the following circumstances -

(a) that the restriction is reasonably necessary, having regard to the character of the goods to which it applied, to protect the public against injury (whether to persons or to premises) in connection with the consumption, installation or use of those goods;

(b) that the removal of the restriction would deny to the public as purchasers, consumers or users of any goods other specific and substantial benefits or advantages enjoyed or likely to be enjoyed by them as such, whether by virtue of the restriction itself or of any arrangements or operations resulting therefrom;

(c) that the restriction is reasonably necessary to counteract measures taken by any one person not party to the agreement with a view to preventing or restricting competition in or in relation to the trade or business in which the persons party thereto are engaged;

(d) that the restriction is reasonably necessary to enable the persons party to the agreement to negotiate fair terms for the supply of goods to, or the acquisition of goods from any person not party thereto who controls a preponderant part of the trade or business of acquiring or supplying such goods, or for the supply of goods to any person not party to the agreement and not carrying on such a trade or business who, either alone or in combination with any other such person, controls' a preponderant part of the market for such goods;

(e) that, having regard to the conditions actually obtaining or reasonably foreseen at the time of the application, the removal of the restriction would be likely to have a serious and persistent adverse effect on the general level of unemployment in an area, or in areas taken together in which a substantial proportion of the trade or industry to which the agreement relates is situated;

(f) that, having regard to the conditions actually obtaining or reasonably foreseen at the time of the application, the removal of the restriction would be likely to cause a reduction in the volume or earnings of the export business which is substantial either in relation to the whole export business of the United Kingdom or in relation to the whole business (including export business) of the said trade or industry;

(g) that the restriction is reasonably required for purposes connected with the maintenance of any other restriction accepted by the parties, whether under the same agreement or under any other agreement between them, being a restriction which is found by the Court not to be contrary to the public interest upon grounds other than those specified in this paragraph, or has been so found in previous proceedings before the Court,

and is further satisfied (in any such case) that the restriction is not unreasonable having regard to the balance between those circumstances and any detriment to the public or to persons not parties to the agreement

(being purchasers, consumers or users of goods produced or sold by such parties, or persons engaged or seeking to become engaged in the trade or business of selling such goods or of producing similar goods) resulting or likely to results from the operation of the restriction.

(b) The Case for the CMF

The CMF, in presenting its case for the retention of its restrictive agreements, relied upon paragraph (b) of Section 21(1) of the Act, claiming that, in the absence of the agreements, the public would be denied specific and substantial benefits of which the most important was the benefit of lower prices. The CMF argued that seven benefits had been conferred upon the public as a direct consequence of its restrictive agreements.

Firstly, the common price arrangements had been so operated, via the independent costs committee, as to hold prices below the level that would have obtained under conditions of unregulated competition. In support of this proposition, the CMF presented evidence that the range of costs as between individual manufacturers was small, with a 3 per cent difference between the highest and lowest average costs of the six largest makers, and with the highest cost manufacturers varying from year to year. (The CMF rejected the notion that plant cost variations were relevant on the ground that plant cost variations gave little indication of efficiency differentials given that there is an inevitably a diversity of plant vintages at any point in time). In addition, the CMF presented evidence to the effect that productivity, measured in terms of output per member, was better than in all European countries and that output per employee was greater than in the USA. In general, therefore, the CMF claimed that its price agreement operated from a basis of technical and cost efficiency. The CMF presented profit

figures for UK cement production on bases ranging from historical costs and depreciation at rates allowed by the Inland Revenue for tax purposes at one end to depreciated replacement value of assets at the other end of the accounting spectrum. On whatever basis, the evidence showed that rates of return on capital in cement were reasonable and compared favourably with rates of return elsewhere. Specifically, over a period of 8 years prior to the case members of the CMF had achieved rates of return on capital, on a replacement basis, of less than 10 per cent. Expert witnesses testified that, in the absence of the security provided by the price agreement, a return of between 15 and 20 per cent on capital employed would have become necessary at that time to attract investment finance into the cement industry. Such a rate of return was available at that time.

Secondly, the CMF contended that its common price agreement avoided the wasteful use of transport. The cost of transport comprised a high proportion of the total cost of cement and the agreement was designed to avoid cross-freighting and, thereby, to economise on transport costs. The effect of the delivered price system was to offer a maker a proportionately more attractive price if he sold cement within the area covered by circles radiating from his works. Even within these areas, the effect of 'freight averaging' was that it was cheaper to sell to customers nearest to a maker's works. Before the scheme had been initiated in 1934, there had been considerable cross-freighting. Cement sold in London had been supplied from works in South Wales and cement sold in South Wales had been supplied from works near London. The CMF presented evidence that, apart from the works near London and The Home Counties (which had capacity in excess of the local market, the output of the various works was sold in the parts of the country where the works were situated. The works in The Home Counties also supplied the export trade. The CMF's evidence demonstrated that in relation to the general level of costs, the cost of transport had been falling substantially throughout the operation of the agreement.

Thirdly, the CMF claimed, as a benefit of the common delivered price, the avoidance of the cost to users of 'shopping around' in order to obtain the cheapest available cement. This weak claim was advanced, no doubt, because it had succeeded in convincing the Court in a previous case involving the Black Bolt and Nut Association's restrictive price agreement.

Fourthly, the CMF claimed that its arrangements avoided a possible abuse of its position by the largest maker, APCM, which then supplied two-thirds of all cement delivered to U.K. markets. Under the arrangements, the voting power of APCM had been reduced to 36 per cent, and no resolution could be passed unless four members (out of the eight then in existence) voted in favour. These voting rules, in conjunction with the existence of the independent costs committee, adequately controlled the power of the APCM. In the absence of the arrangement, the only control over APCM would be its susceptibility to a Monopolies Commission reference.

Fifthly, the CMF claimed, as a benefit from its agreements, the work of the Cement and Concrete Association, which devoted itself to research development and training. Members financed the Association entirely by subscriptions (9n 1964 amounting to £430,000). The Association made available the benefits of its services to all purchasers of cement. The CMF argued that any termination of its agreements must jeopardise the existence of the Association.

Sixthly, the CMF claimed the arrangement had enabled the cement industry to expand capacity to meet rising demand without creating excess capacity and without excessive reliance upon imports even in 1952 and 1953 when temporary shortages occurred as a consequence of sharp increases in demand from the housing and the defence markets.

Seventhly, the CMF claimed that its arrangement assured the provision of cement at places far removed from supply centres. The supply of cement

over long distances was an unprofitable business, but with 'freight-averaging' customers far distant from cement plants did not bear the full cost of transport. Under competition, prices to the very distant customers would rise considerably, and in some cases, the increase might be such that cement would no longer be demanded. Under the common price arrangement, no such customer had experienced a shortage of cement supplies.

(c) The Registrar's Criticisms

The Registrar of Restrictive Practices, in his reply to the CMF, denied that any of the seven arguments were valid and requested that the arrangement should be terminated. Firstly, the Registrar claimed that the common price agreement distorted the price structure for cement which would emerge in a free market. Under the scheme, the customers nearest to the cement works paid more than would be the case under competition and customers far distant from the works paid less. In this respect, the scheme was 'arbitrary' and 'artificial'. The Registrar acknowledged that freight averaging might occur under price competition but denied that it would offer a systematic subsidy to customers far distant from cement works. An arbitrary price structure which gave rise only to reasonable profits could not be designated 'reasonable'.

Secondly, whilst conceding that the rate of return on capital in cement manufacture was reasonable by reference to other industries, on the bases provided by the CMF, the Registrar argued that such comparisons were unjustified in this case in view of the large accumulation of cash and depreciation reserves by cement companies. The Registrar urged a comparison of the returns on risk capital, which would be less favourable to the CMF given that a large proportion of capital in cement manufacture consisted of debenture issues. Furthermore, if the Registrar's own analysis of rates of return were accepted, profitability varied markedly from firm to firm. In such circumstances, a low average for the industry as a whole was

not proof that the pricing structure was low or reasonable.

Thirdly, the Registrar attacked the CMF's reliance upon a comparison of cement costs on a manufacturer basis, claiming that the divergence of individual works costs was wide. The averaging of the costs of makers with multiple works masked the inefficiency of high cost works in a way which would not occur under price competition.

Fourthly, the Registrar queried the degree of control exercised by the independent costs committee over the makers, claiming that influences other than the scheme had restrained the CMF from setting high prices. Notably, in the early postwar period, the threat of nationalisation had moderated cement price-fixing, whilst the later postwar period had been influenced by the 1956 Act itself and then by the reference of the CMF's agreements to The Restrictive Practices Court.

Fifthly, whilst conceding that the CMF's arrangements had tended to promote sales near the works and to lower transport costs, the Registrar claimed that the benefits therefrom were wholly outweighed by other factors. Notably, the nearest customers paid more for their cement than would be the case under competition, the scheme discouraged low cost works from absorbing freight costs and invading the markets of their rivals, whilst the subsidy to far distant customers discouraged the building of new capacity in areas without existing works. Specifically, the scheme, as operated, had the effect of retaining the Medway works in use, although they were high cost works. If the scheme were ended, makers would expand in areas such as Lancashire to the detriment of the longhauls from the Thames-Medway works.

Sixthly, the Registrar rejected the notion that the continued existence of the Cement and Concrete Association depended upon the maintenance of the CMF's agreements and the view that the scheme had enabled members to plan expansion of capacity effectively. Indeed, the

Registrar claimed that the CMF had expanded capacity at a rate barely in line with the increase in demand with a view to perpetuating a seller's market.

Seventhly, the Registrar noted that, if the scheme were to be continued, there was no inherent safeguard in it against unjustifiable price increases in the future. Even if the independent costs committee possessed very great influence, in the absence of a legal basis, the success of its works would depend to a large extent on the character of those who happened to be members at any point in time, which must be a matter of speculation. In this regard, the Registrar urged that it was the agreement, and not the manner in which that agreement had been operated, that was relevant in considering the application of paragraph (b) of Section 21(1) of the 1956 Act.

(d) The Judgment of the Court

The Court, in its judgment, formed a view on a number of issues over which the CMF and the Registrar had been in dispute, prior to assessing the CMF's case by reference to gateway (b) of the Act.

Firstly, the Court concluded, following a survey of the evidence, that the CMF's price structure indeed had been successful in general in making it unattractive to a cement manufacturer to deliver cement beyond the area in which the distance zones were based on the works from which delivery was made. The Court accepted in general that the overall cost of delivering cement to zones based on inland works had been kept to a minimum and that cross-haulage virtually had been eliminated.

Secondly, the Court concluded that the evidence strongly indicated that, over the previous eight years, the CMF's price policy had produced rates of return on capital appreciably below those achieved by manufacturing industries in general in the United Kingdom. During the period under consideration the market for cement had been a seller's market.

Thirdly, the Court determined, in favour of the CMF, that the evidence did not support the Registrar in his criticism that the cement industry had failed to expand the overall capacity of the industry in proper relationship to demand. Indeed, a faster rate of expansion might well have raised production costs. The Court also concluded that expansion appeared to have taken place economically from the viewpoint of geographical location.

Fourthly, the Court concluded on the basis of the evidence that, taken as a whole, the industry had operated with a high degree of efficiency insofar as costs of production were concerned. The Court accepted the CMF's view that considerable variation in the costs of individual works was inevitable in a manufacturing process in which physical and geographical factors exercised such a substantial influence on costs. The Court expressed itself to be satisfied that, under the CMF's agreements, the cement industry as a whole had operated efficiently with respect both to production and to delivery costs and that prices, overall, had been reasonable.

Fifthly, the Court expressed itself to be satisfied with the performance of the independent costs committee, which had performed its functions "independently, carefully and fairly", and concluded that it had been effective "in exercising a wise control over prices". Particular criticisms were directed at information deficiencies, namely (i) that the committee was not supplied with the costs of individual works operated by multiple plant companies, (ii) that the bases of depreciation adopted by the various companies were not disclosed to the committee, (iii) that the committee had not made, prior to the case, any investigation into the capital employed in the industry and (iv) that the consideration of returns by the committee had always been confined to those relating to home trade in ordinary and in rapid hardening Portland cement, thereby omitting the export trade and the performance of special cements. However, the Court

conceded that cement prices probably would have been no different had these deficiencies been eliminated.

On the basis of these conclusions, the Court evaluated the CMF's agreement by reference to 'gateway' (b), centring attention upon the CMF's suggestion that the overall price of cement delivered in the U.K. would be lower if the agreement continued than if it were to be abrogated. The Court accepted as correct three propositions, namely (i) that in an expanding industry, in the long term, the competitive price level would provide a sufficient return on cement produced at new works to attract the investment of capital, (ii) that in the future, supply would match demand except for short periods at particular times and places and (iii) that the minimum return which will attract investment in a new works would be higher under free competition than under the common price agreement, because the risk would be greater. The Court then addressed attention to two crucial issues, namely (i) whether the CMF would in fact fix prices at a level lower than that required to attract investment capital under free competition and (ii) whether the difference in price level would be sufficient to constitute a "substantial" benefit to the public as purchasers of cement.

The Court accepted the unanimous view of the expert witnesses called to give evidence that the return required upon new capital invested in the cement industry under free competition would be in the range of 15 to 20 per cent. Following a detailed assessment of the price level implications of a shift from less than 10 per cent to the free competition requirements, the Court concluded that the latter could be achieved only by an increase in the price of cement which should be described as 'substantial'. Furthermore, on the basis of all available evidence, and on the assumption that the information deficiencies previously outlined were to be rectified, the Court accepted that the CMF would continue to operate the price agreement with the same sense of responsibility and restraint as they had shown to

that time. Any concern as to changes in membership of the independent costs committee had been alleged, to the satisfaction of the Court, by the CMF's assurance that information relative to prices and costs would be supplied to the Registrar at the latter's request for the purpose of his deciding whether he should make application under section 22 of the Act on the ground that there had been a material change in the relevant circumstances.

The Court therefore concluded that the CMF's main price agreements had successfully negotiated 'gateway' (b) and, in the absence of offsetting detriments, the agreements were declared to be not contrary to the public interest. A number of relatively minor restrictions, providing for general rebates to large users and large merchants, and prohibiting quotations and contracts for the supply of cement for periods exceeding 12 months, were found to be contrary to the public interest and, accordingly, void.

4. The Restrictive Practices Court and the Cement Agreements (1973-1974)

In 1973, some 12 years after the favourable decision on the CMF's common price agreements, the Registrar of Restrictive Trading Agreements, in his last act before his Office was merged in that of the Director-General of Fair Trading, applied to The Restrictive Practices Court under section 22 of the 1956 Act for leave to apply to the Court for the Court to reconsider its previous decision on the ground that there had been a material change in the relevant circumstances. This was only the second occasion upon which the jurisdiction of the Court had been invoked under that section of the Act.

The Registrar claimed that:-

(i) The cement industry is not at present, and has not been for a number of years, an expanding industry working to full capacity.

(ii) Prices are no longer fixed under the ... agreement at a level lower than that which would be required under free competition to attract investment of capital in new works.

(iii) Accordingly, the reasoning by which the court concluded that the agreement is so operated as to keep down the overall price of cement to a level substantially lower than it would have been under free competition is no longer applicable.

(iv) Since 1961 there have been important improvements in the methods of distribution of cement, but the agreement is not so operated as to take any or any substantial account of them; in particular, purchasers, consumers and users of cement who require cement at places near to bulk depots are deprived of the opportunity to purchase cement at prices which take into account the savings in costs resulting from the delivery of cement from low cost works to such depots in bulk and by modern means of transport.

(v) There have been no significant changes in base prices and distance circles since 1961 except where necessitated by the opening of new works and the closures of old ones; base prices at new works have in most cases been fixed substantially above normal and have not been reduced to take account of efficient and low-cost production of such works; and in the result purchasers, consumers and users of cement who require cement at places supplied from a works for which the base price is fixed substantially above the normal are deprived of the opportunity to purchase cement at a price which takes due account of the costs of production at those works.

(vi) It is no longer correct that in view of the infrequency and small scale of changes in the price of cement the terms of the agreement, preventing members of the Cement Makers' Federation ... from quoting a fixed price for cement delivered throughout the period of a long term contract do not result in any serious financial disadvantage to purchasers of cement.

(vii) The federation has in making the price increase which came into operation on May 10, 1971, departed from the principles on which prices have been fixed in the past, and that increase was, accordingly, substantially greater.

The Court proceeded to consider evidence with a view to assessing whether it amounted to prima facie evidence of a change in an essential part of the reasoning by which the court arrived at its previous conclusion. Of the grounds relied upon by the Registrar, the first three were seen to be the most important.

The Court considered a range of evidence concerning whether or not the cement industry remained an expanding industry. The Registrar demonstrated that the total production of common price cements was the same in

1964 as in 1971, namely 15.6 million tonnes. However, the total home production of cement for all purposes was 16.78 million tonnes in 1964 and 18.23 in 1971. Furthermore, capacity had increased from 13.75 million tonnes in 1960 to 19.58 in 1972. Overall, the Court considered that the cement industry had expanded since 1961 in line with its forecasts at that time.

Following a detailed analysis of the rates of return on capital earned by the six new works, the Court felt unable to support the Registrar's viewpoint. Taking the return on capital for all six works together, the highest return for any year since 1962 had been 8.97 per cent and for 1972 the figure was 6.82 per cent, all on depreciated replacement values. The Court expressed itself to be impressed by the low returns on capital employed in the cement industry as compared with the average returns for other industries.

Having rejected the Registrar's submissions under ground (i) and (ii) above, the Court was clearly unable to accept that a prima facie case had been made for ground (iii).

The fourth ground relied upon by The Registrar concerned a new detriment since the use of depots was not referred to in the 1961 Judgment. The use of depots had greatly increased (52 in 1972 as compared with 23 in 1961) and such depots for the most part were fed by special trains consisting of 100 ton cement wagons in which the cement was carried under pressure so that it could be blown out on discharge. The Registrar suggested that cost savings from the establishment of bulk depots had not been accommodated into the common price agreements. Evidence analysed by the Court in fact showed no general reduction in delivery costs in favour of depots. The Court therefore dismissed ground (iv) of the Registrar's submission.

The Court also dismissed the Registrar's argument under ground (v), pointing out that price adjustments since 1964 had been influenced to a

marked degree by Prices and Incomes legislation and by voluntary price freezes. Given the Court's view that cement price levels had been substantially lower as a consequence of the price agreements, the Registrar had failed to produce evidence supporting the submission that there was substance in ground (v) of his application.

The Court also dismissed ground (vi) of the Registrar's application, pointing out that the inability of customers to obtain long-term fixed price contracts for the supply of cement was a detriment of a very limited nature. The biggest increase in cement prices - 17 per cent in May 1971 - resulted in an overall increase of 0.51 per cent of a building or civil engineering contract. For cement constitutes only about 3 per cent of the total value of such contracts. There had not been a suggestion of a material change in the circumstances relative to this restriction.

Finally, the Registrar introduced no evidence in support of ground (vii) of his application which related to a price increase in May 1971 which was designed to achieve an overall return on capital employed of 10 per cent for the whole of 1971 (i.e. which contained an element of retrospection). The Court rejected the Registrar's plea.

For these reasons, the Court concluded that prima facie evidence had not been adduced of a material change in the relevant circumstances. The leave sought by the Registrar was refused and CMF's common price agreement remained operative.

5. The 'Critique' by The Price Commission (1978)

In its recent Report entitled 'The Associated Portland Cement Manufacturers Limited - Increase in Cement Prices' the Price Commission commented upon the CMF's common price agreements in adverse fashion and interfered with the price structure by the specific nature of its price increase resolutions. Although the Commission's critique almost entirely

was gratuitous, given the decision of the Court, its price decisions clearly affect the price structure for cement. For this reason, a brief (and not uncritical) resumé of its views has been incorporated into this chapter. It is clear from the Report that the Price Commission failed fully to comprehend the specific nature of Section 21(1)(b) of the 1956 Act and the requirement only to demonstrate the existence of a 'specific and substantial' benefit, rather than to establish a general case for the retention of a restrictive agreement.

There is a marked similarity in the views of the Price Commission and those of the Registrar as advanced in 1961. Once again, the criticism was advanced that the way in which production costs were averaged by the CMF avoided any penalty for persistent low efficiency. The Price Commission calculated cost indices for each of the eight cement plants of APCM in 1973, demonstrating that five plants had lower manufacturing costs per tonne of cement than the largest plant. Yet three such plants sold at the same 'basing point price' as the largest plant and two such plants actually sold at higher basing point prices! Furthermore, both in 1973 and in 1977, the cost per tonne in the dry and semi-dry process plants had been lower than for the wet process, with the unweighted average difference widening from 15 per cent in 1973 to 22 per cent in 1977. This difference was not reflected in base prices which, on average, were higher at the dry and semi-dry works; nor was the widening cost differential between 1973 and 1977 reflected in price movements, which were uniform for all plants.

This criticism in fact was acknowledged by The Restrictive Practices Court both in 1961 and 1974, but dismissed as of insufficient significance to counteract the 'substantial and specific' benefit to users arising from overall low cement prices. The Price Commission failed to make this important comparison in its 1978 Report.

However, the Price Commission further argued that the failure of the common price agreement to reflect high plant costs in high basing point

prices encouraged inefficiency in cement production. This argument at best is ambiguous, for it is clearly possible that the combination of high production costs and low prices might induce cement manufacturers either to shut down high cost plant or to improve efficiency as a means of raising the return on capital to the company as a whole. Certainly, the competitive model does not predict high basing point prices for high cost works in a market as homogeneous as that for cement.

The Price Commission was also critical of the cross-subsidisation which resulted from failure to recover the full cost of deliveries to the distance zones. Table 48 outlines the extent of cross-subsidisation in the case of APCM products over the period 1973 to 1977:

Table 48 Cross-subsidisation of APCM Cement Deliveries

	1973 £m	1974 £m	1975 £m	1976 £m	1977 £m
Total cost of distribution	18.9	20.5	25.4	27.9	30.5
Cost recovered in pricing structure	6.4	6.4	8.8	9.8	10.5
Net subsidy	12.5	14.1	16.6	18.1	20.0
Net subsidy as % of:-					
- distribution cost	66%	69%	65%	65%	66%
- net sales revenue	11%	13%	11%	11%	11%
Net subsidy					
- in £'s per tonne	1.02	1.30	1.61	1.94	2.36
- index (£ per tonne)	100	127	158	190	231

(Source: Price Commission, op.cit.)

The Price Commission claimed that the 'basing point system' operated by the CMF had a number of effects which ran counter to its own objectives as defined under section 2 of the Price Commission Act. Firstly, the existence

of cross-subsidisation strengthened other aspects of the common price agreement which permitted inefficiency and high costs. In particular, the pattern of demand was distorted significantly in the case of cement where transport costs are almost 20 per cent of sales revenue and where cross-subsidisation is significant.

Secondly, such a disparity between costs and transport charges discouraged customers from collecting or arranging their own transport. The Commission argued that this had created a substantial distortion in the market for transport services, with the zone system operating as a barrier to the growth of an independent transport network.

Thirdly, the method whereby the transport subsidy was recovered offered no obvious inducement to APCM to increase the efficiency of its transport fleet. The ability to recover a transport subsidy through higher 'basing point prices' obscured the true costs involved and weakened the incentive to seek even greater efficiency.

Fourthly, the Price Commission complained that the distribution system offered an inadequate incentive to collect by customers in the form of the small collection allowances for bulk and bagged cement. The fact that only 6 per cent of sales were collected indicated that customers had not found it worthwhile. Closely allied to this was the issue of merchants. Although there was no agreement amongst CMF members to deal only through merchants, the fact that 95 per cent of all sales were handled through them meant (to the Price Commission) that for all practical purposes a sustem of exclusive dealing existed. It was likely, therefore, that users paid, through discounts given to merchants, for services that were not required, or that they could perform themselves, possibly at lower cost. This was especially likely in the case of the largest users of cement.

Finally, the Commission was critical of the subsidy provided to customers for cement supplied in bags. For 10 tonne loads delivered the

user was charged an additional £0.93 per tonne, whereas the extra costs incurred were estimated to be £1.70 per tonne. Such deliveries amounted to 25 per cent of APCM's total sales. The Commission argued that higher charges might induce customers to economise by purchasing in bulk.

In recommending that certain price increases should be permitted in the case of APCM, the Price Commission made use of its authority to influence the composition of the 'basing point pricing' scheme, as the following observation from its 1978 Report clearly indicates:

> "We would expect the company to apply the increases in the prices of ordinary, rapid hardening and coarse ground Portland cements permitted by our Recommendations in the main to make proportionate increases in prices, other than 'Basing Point Prices', so as to reduce, so far as possible, the element of cross-subsidisation in present distribution and transport arrangements. We would also expect the company to make further progress towards further reducing such cross-subsidisation in any future ratifications for price increases" (pp. 60-61).

Conclusions

In outlining the nature of the common price and marketing arrangements of the CMF and depicting the history of investigations into its much-reviewed arrangements, we have not attempted to evaluate its welfare implications. Others have been less than reticent in this regard. It must be apparent, however, from a reading of this chapter that a government which legislates for investigating bodies so differently defined and with over-lapping jurisdictions contributes substantially to the complexity of devising acceptable arrangements of industrial organisation.

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Chapter 7 INTERNATIONAL TRADE

International trade in cement products is relatively unimportant, largely as a consequence of freight costs which are high relative to the delivered price of the products. For this reason, countries with an adequate manufacturing capacity relative to domestic demand largely are protected from import penetration. This explains, for example, the total absence of UK cement exports to Europe and the absence of European cement exports to the UK save for the trade between Eire and Northern Ireland, where distances are not great.

As Table 49 outlines, imports have comprised a declining percentage of total cement deliveries to U.K. markets over the period 1967-77, and now are of trivial importance. By contrast, exports have formed a rising percentage of UK cement production, for the most part responding to cement shortages in the developing world. Increasingly, however, UK cement manufacturers are avoiding the heavy freight costs involved by establishing interests in new cement capacity located in developing world countries. When domestic capacity is adequate by reference to domestic demand in such countries, UK exports may be expected to decline to insignificant levels.

The European cement industries have a history of restricted competition. Before the Second World War, there were cartels in most countries, and the more important producers co-operated in the International Cement Export Conference. In addition, there existed a Five Nation Agreement between the Netherlands, Germany, France, Belgium and the United Kingdom which controlled cement supplies to the Dutch market.

The postwar situation, however, has been radically different, reflecting a greater hostility towards the cartelisation process. Immediately after the war, cartels in the USA and French zones of Germany were prohibited, and in the British zone also by 1948. The introduction of competition legislation in all the EEC countries and, subsequently, the growing scope of Articles 85

Table 49 Imports and Exports as a % of UK Cement Deliveries

Year	Imports (mill.tonnes)	% of UK Deliveries	Exports (mill.tonnes)	% of UK Deliveries
1967	0.17	1.0	0.31	2.0
1968	0.15	1.0	0.22	1.2
1969	0.06	0.3	0.28	1.6
1970	0.03	0.2	0.71	4.2
1971	0.07	0.4	0.67	3.8
1972	0.08	0.4	0.80	4.5
1973	0.10	0.5	1.55	7.8
1974	0.11	0.6	1.02	5.9
1975	0.08	0.5	0.99	5.9
1976	0.05	0.3	0.99	6.4
1977	0.02	0.1	1.69	11.7

(Source: Cement Makers' Federation)

and 86 of the Treaty of Rome has created a very different legal and economic climate. Except for the UK (as outlined in Chapter 6) formal cement cartels have disappeared within EEC, although 'crisis' cartels are permitted, under special circumstances, in the Federal Republic of Germany.

The development and application of EEC competition policy has invoked considerable changes in behaviour during the 1970's. The Noordwijk Cement Accord, signed between Dutch, West German and Belgian producers in 1956, as a successor to earlier arrangements outlined above, together with its subsequent amendments, have been altered significantly following EEC

proceedings. In addition, the European Commission in 1972 found an internal Belgian cement cartel to be contrary to Article 85. The precedents established by such decisions inevitably influence the state of competition in cement products throughout EEC.

There is no evidence whatsoever, however, that the UK cement manufacturers operate arrangements which influence the pattern of international trade in cement products within or without Europe. Some such evidence, if available, would have been located during one or more of the several investigations of the UK Cement Makers' Federation by The Restrictive Practices Court, the National Board for Prices and Incomes and The Price Commission during the past seventeen years.

Rather, the evidence suggests that UK cement companies are anxious to penetrate export markets wherever profitable opportunities exist and indeed to develop financial interests in overseas cement making capacity in markets where cement consumption continues to increase. During periods of sustained excess capacity in the domestic market, as at present, there is little likelihood that UK producers will refrain from exporting to profitable markets.

CHAPTER 8 RECENT DEVELOPMENTS IN THE U.K. CEMENT INDUSTRY

In this chapter, a number of recent developments in the cement industry - which have not been accounted for in other chapters - are briefly outlined.

1. The World Cement Scene

The period 1953 to 1973 was characterised by continuous growth in the world cement markets, with world cement consumption increasing four-fold to a total of nearly 700 million tons. Over the same period, cement consumption in the non-Communist European countries increased three-fold, whilst that of the United Kingdom only doubled and that of the USA only grew by 75 per cent. Clearly, therefore, growth in U.K. cement consumption lagged significantly behind that in the rest of the world. By 1973, the USSR was the largest cement consumer and Japanese cement production equalled that of the USA.

Since 1973, however, the effects of the rise in oil prices and the subsequent acceleration in the rates of inflation have lowered cement consumption in Western countries as governments have lowered public expenditure and as the private sectors have experienced recessions. Table 50 outlines the extent of the recession in a number of leading Western countries in the immediate post 1973 situation:

Table 50 Cement consumption in Europe and the USA (000's tonnes) 1973 and 1975

	1973	1975	1975 as % of 1973
USA	78,250	60,805	77.7
Italy	35,688	34,070	95.5
West Germany	39,711	31,450	79.2
France	29,892	28,635	95.8
Spain	21,592	20,700	95.9
U.K.	20,019	16,830	84.1

(Source: APCM Report and Accounts 1975 p.23)

As is clear from Table 50 the initial impact on cement consumption of the world recession was more serious in the UK, the USA and in West Germany than in other leading European countries. In such circumstances, it is not surprising that some European manufacturers have directed export attention to the developing markets which, as Table 51 indicates, were largely unaffected by the recession in Europe and the USA.

Table 51 Cement Consuption in developing Countries (000's tonnes) 1973 and 1974

	1973	1974	1974 as % 1973
Algeria	2,227	2,948	132
Libya	1,871	2,580	138
Israel	1,577	1,867	118
Saudi Arabia	1,364	1,800	132
Arabian Gulf States	1,500	2,200	147
Iran	4,020	5,239	130
Pakistan	2,396	3,150	131
Indonesia	2,056	2,522	123

(Source: APCM Report and Accounts 1975, p.23)

The major cement producers have looked therefore to exports as a solution to over-capacity, but with varying degrees of success. Other factors than the availability of supplies influences exports, notably proximity to markets, rates of freight, shipping opportunities and profitability. There was also a radical change after 1973 in the direction of exports. In 1973, the USA was the largest importer, taking over 6 million tons or one-sixth of the world cement trade. The halving of this figure by 1975 contributed substantially to European excess capacity. The largest export markets are now in North and West Africa, and in Iran and the Arabian gulf, the former of which are most economically supplied by the Mediterranean European producers and the latter by Japan and other Asian producers.

Cement is a bulky and expensive cargo to send by sea and, although Western countries largely have turned to bulk delivery systems in their domestic markets, the developing countries typically purchase cement in bags. Their ports do not have the facilities for accepting bulk cement nor, if it could be landed - at a much faster rate than bagged cement - have they the means of transporting it or storing it.

An inevitable consequence of excess capacity and increasing competition in export markets is that much export trade is unattractive, effected at prices below the full cost of production as a means of making some contribution to overheads. Many Western manufacturers finding export trade in such circumstances to be unacceptably unattractive have closed down kilns or even complete works, temporarily in the case of modern plant but permanently for old equipment. Increasingly, European manufacturers have turned to the activity of selling their expertise to developing countries desirous of producing their own cement. In the U.K. APCM's Consulting Service has been prominent in this exercise. Furthermore, several European cement manufacturers, in particular those of Switzerland, France and Belgium, and APCM for the U.K., have taken a financial interest in companies in the developing countries or have set up subsidiary or associated companies in those countries.

The most widely spread overseas interests are those of APCM and most of these are in countries, outlined in Table 52 where cement consumption has continued to grow.

Table 52 Cement consumption in (000's tonnes) - APCM overseas interest

	1973	1974	1974 as % of 1973
Canada	9,051	9,656	106.7
Mexico	9,567	10,285	107.5
Brazil	13,510	15,037	111.3
Kenya	431	398	92.3
South Africa	6,841	7,275	106.3
Nigeria	1,923	2,222	115,5
Singapore	1,126	1,132	100.5
Malaysia	1,455	1,644	113.0
Australia	5,287	5,071	95.9
New Zealand	1,046	1,098	105.0

(Source: APCM Reports and Accounts 1975, p.23)

2. Energy Conservation in U.K. Cement Manufacture

The manufacture of cement has always required a large input of energy and energy costs account typically for 40 per cent of the total manufacturing cost of cement. Of the energy consumed, 90 per cent is used in the firing of the rotary kilns and - by way of contrast - less than 1 per cent is used on the distribution of the product. Any significant savings in energy, therefore, must be achieved at the point of manufacture.

Kilns are fired by natural gas, oil or coal, the choice being determined, in the main, by cost. As we outlined in Chapter 2, approximately 84 per cent of existing kiln capacity in the UK is coal-fired, approximately 11 per cent is gas-fired and 5 per cent is oil-fired. Although coal price rises to date have not matched the dramatic increases experienced in the price of oil, nevertheless they have made a substantial contribution to the rising price of cement.

Between 1965 and 1976, the amount of fuel used in the U.K. to produce a ton of cement has fallen by some 25 per cent due to improvements in existing plant and to the building, wherever possible, of new dry process or semi-dry process cement works. Even with new plant, economies are still possible and, in 1975, there was a 3 per cent fall per tonne in fuel consumption in modern plants.

The most dramatic energy saving decision would be to convert all existing wet process plants to the more energy efficient dry process - a conversion of over 70 per cent of the UK productive capacity. But such a decision is uneconomic. In the past, factors other than energy costs have dominated in the choice of cement manufacturing processes. The nature and location of the raw materials often made it impracticable to utilise the dry process (as for example was the case with APCM's North fleet Works).

The manufacture of cement is highly capital-intensive and during periods of recession it is not thought to be economically worthwhile to convert existing, non-absolute wet process plants to dry. Energy saving only, in such circumstances, will not support the required investments.

The APCM's worldwide consultancy organisation has built up a considerable amount of energy experience which is supplied on a commercial basis to other cement producers throughout the world - not least to the USA - where the energy input can be as much as 40 per cent higher per tonne of cement than in the UK.

3. APCM's Contributions to Research and Development

As the largest cement producer in the UK, APCM devotes considerable attention to research and development. In 1977, APCM expanded a total of £3 million (or 1¼ per cent of its sales) in this exercise. For many years, the company has led the cement industry throughout the world in specialised research into certain techniques of cement production. It remains a leader in developing new technology.

Much of the company's success in energy conservation has been based upon detailed studies of kiln chain operation and by developing methods of reducing moisture levels in feed slurries, and thereby in reducing fuel consumption per tonne of cement in the wet process by 19 per cent between 1967 and 1976.

Since 1973, the company the APCM has been testing methods of reducing fueld costs. All oil fired kilns have been or are being converted into coal fired. Following trials, carried out in 1975, which demonstrated that the combustible content of council refuse collection, after treatment, could be used to reduce coal consumption without loss of cement quality, APCM installed at its Westbury works a plant for the handling of refuse. Approximately 5 tonnes of combustible refuse is required to replace 1 tonne

of coal; but the refuse has to be used in balanced proportions with coal fuel. There is now substantial evidence that provided the rate of addition of refuse is kept below 12 per cent and confined to suitable plants, with robust crushing machinery the clinker quality is unaffected.

APCM additionally supports research into product innovation and has developed a considerable variety of cement products for special applications. Indeed, APCM is the only UK cement manufacturer to carry out any significant amount of product development. The largest volume cement product launched by APCM in recent years has been oil well cements. APCM is the only maker of these in the UK.

Although much of the work of APCM's research division is concerned with developments within the company, it also acts in association with external research groups involved in studies into production and uses of cement. There is, for example, extensive involvement with the British and European Standards committees on behalf of the cement industry. Research into the properties and uses of cement is supported additionally by the APCM as the largest subscriber to the Cement and Concrete Association, which is financed by UK cement manufacturers and which complements APCM's extensive testing to improve product standards and to ensure that customers' requirements are satisfied.

Finally, APCM provides a wide range of technical consulting services overseas, which it has developed via its role as provider of technical services to its associate companies. This APCM service covers not merely technical management but also general management and is provided against technical services agreements, for which a service fee is paid. In its capacity as consultant, APCM thus provides a service extending over the whole course of a project from financial appraisal to project completion. The services now provided fall into three main categories:

(i) the design, construction and commissioning of new or replacement manufacturing capacity;

(ii) the appraisal of the efficiency of existing plant and the implementations of innovations and improvements; this service is provided largely for companies outside the group;

(iii) the provision of a complete management service for the operation of new plants, whether built by the group or not, in the developing world.

These overseas consulting services, apart from their financial contribution to APCM's operations, have enabled APCM to maintain a high standard of technical knowledge during a long period in which no major new capacity has been built in the UK.

4. Cement and the Environment

As with any industry handling and producing materials in fine powder form, the manufacture of cement generates quantities of dust which must be controlled if high environmental standards are to be maintained. Indeed, dust represents a loss of material to the manufacturing process, and to that extent it is in the economic interest of the manufacturer to ensure that as much as possible is recovered and returned to the process.

Dust can arise at virtually every stage of the manufacturing process, from the handling of raw materials through to the despatch of finished cement in bulk or in bags. The kiln process is a major source of dust in which fine particles in the materials being fired are picked up by the blast of hot gases through the kiln. Suppression and recovery of kiln dust is of major importance. Otherwise, excessive dust in the exhaust gases would be dispersed widely from the kiln chimneys. The dry process tends to produce more kiln dust than other processes, since the kiln is fed with dry raw meal which itself is dusty. In the wet process, dust picked up by gases in the calcining and drying zones of the kiln is partially suppressed by contact with the wet slurry in the upper end of the kiln, particularly in the system of slurry-coated drying chains. All

processes, however, produce a considerable amount of dust which must be removed before the exhaust gases are discharged into the atmosphere.

A further source of dust in the exhaust is the hot air or exhaust gas used to dry raw materials for the dry and semi-dry processes. Dust in the hot exhaust gases from the kiln and associated processes is removed by passage through banks of electrostatic precipitators. These are arrangements of electrodes and earthed plates, between which all exhaust gases must pass. The electrodes are charged with electricity at 50,000 to 70,000 volts, creating a corona discharge which ionises the surrounding gases. Dust particles carried with the gases become electrostatically charged and are attracted to the earthed plates or tubes. The earthed plates are jagged mechanically, shaking the collected dust down into hoppers at the bottom of the precipitator unit from which it is returned to the kiln.

Elsewhere in cement manufacture dust is generated by the disturbance of fine materials - raw materials, clinker and finished cement - and in the process of grinding clinker. To counter such dust pollution, conveyors and other equipment are fitted with dust-proof enclosures, which, however, are not completely effective. Transfer points, where material passes from one piece of equipment to another, are particular sources of dust. These are hooded and fitted with extraction fans which reduce the air pressure within the enclosure and prevent dust from escaping. The air stream usually is cleaned by fabric filters, which periodically are scavenged to recover the trapped materials.

In a typical cement works, equipment for dust control and recovery accounts for many hundreds of thousands of pounds in capital equipment. There is close co-operation between the cement manufacturers and the Government's Alkali Inspectorate, whose responsibility it is to supervise and enforce legislation on dust emission.

Chapter 9 INTERNATIONAL COMPARISONS

International comparisons are easier to make in the case of cement than in the case of most other commodities. For the industry possesses a common technology and makes, for the most part, the same finished products, although the raw materials may differ. In this chapter, we have been able to draw inter alia upon information recently analysed and reported on by The Price Commission (UK) in its 1978 study of a price increase request on the part of APCM (Associated Portland Cement Manufacturers). The Price Commission made extensive use of information provided by Cembureau, by the US Bureau of Mines, the Federal Trade Commission and the Council on Wage and Price Stability, supplemented by staff visits to leading European cement producers.

1. Output

Even by European standards, and more markedly by world standards, the UK cement industry is relatively insignificant as Table 53 outlines. As is evident from Table 53 the UK cement industry accounts only for some 13 per cent of EEC cement production, and a mere 2 per cent of total world cement production. The latter figure is likely to decline as the developing world install and extend their own cement capacity.

2. Consumption

To a very considerable extent, given freight costs, the production performance of a national cement industry is controlled by the demand for cement within the country in question. Table 54 indicates that cement consumption per capita currently is lower in the UK than in any other EEC country and below that also of the USA. In large part, this is explained

Table 53 Production of Cement by Countries 1974 and 1975

Country	Cement Production mill.tonnes	
	1974	1975
E.E.C. (9 countries)	138.4	128.8
1. West Germany	35.8	33.5
2. France	32.5	29.7
3. Italy	36.3	34.2
4. Netherlands	4.1	3.7
5. Belgium	7.5	6.9
6. Luxembourg	0.4	0.3
7. United Kingdom	17.8	16.9
8. Ireland	1.5	1.4
9. Denmark	2.5	2.2
10. Greece	7.0	7.9
11. Turkey	8.9	10.2
12. Norway	2.7	2.8
13. Sweden	3.3	3.3
14. Switzerland	5.3	3.8
15. Austria	6.4	5.6
16. Portugal	3.1	3.4
17. Finland	2.2	n.a.
18. Spain	23.7	23.9
19. USSR	115.0	122.1
20. USA	68.1	62.6
21. Canada	11.7	9.7
22. Japan	73.1	65.5
WORLD	698	702

(Source: Eurostat: Basic Statistics of the Community 1975/76 and 1977)

by differing construction methods and in particular by the abundant supplies in the UK of clay suitable for brick-making:

Table 54 Cement Consumption Per Capita (Kg's) in EEC and the USA 1976

Country	Cement Consumption per Capita (kg's)
Belgium	620
Denmark	431
France	542
Federal Republic of Germany	528
Irish Republic	493
Italy	634
Luxembourg	775
Netherlands	406
United Kingdom	278
United States of America	293

(Sources: Cembureau; U.S. Bureau of Mines
The Price Commission supra p.44)

As Table 55 outlines, many of the market characteristics in the UK are reflected in other EEC countries and in the USA. In particular, sales of cement in bulk in all countries now greatly exceed sales in bags, largely as a response to relatively lower distribution costs in the former process. Sales in bulk and sales to the readymix and precast concrete users clearly are directly associated, and the growing importance of these latter markets has clearly stimulated the switch from bag to bulk deliveries. The UK and Denmark are distinctive in the significant use made of intermediaries in the selling of cement products.

Table 55 The Market Profile of Cement Consumption (1976)

Country	Proportions (kgs) sold to main market segments		Proportion sold in bulk	Proportion sold through intermediaries
	Readymix concrete	Precast concrete		
	%	%	%	%
Belgium	33	23	71	33
Denmark	32	42	74	76
France	26	17	63	65
Fed.Rep.of Germany	45	27	78	n.a.
Irish Republic	24	30	58	39
Italy	26	13	56	n.a.
Luxembourg	22	n.a.	61	0
Netherlands	40	34	80	46
United Kingdom	40	28	73	94
United States of America	66	14	92	n.a.

(Sources: Cembureau and U.S. Bureau of Mines : The Price Commission supra p.44)

3. Qualities and Grades of Cement

The range of cement qualities is somewhat wider in Continental Europe than in the UK, principally because European cement makers utilise, in addition to pure Portland cement, a blend containing between 5 per cent and 65 per cent of blast furnace slag - a by-product of steel manufacture with a very similar chemical composition to cement clinker. A principal disadvantage of the blend is that, when made up into concrete, its compressive strength up to 28 days from mixing is up to 30 per cent lower than that based on pure Portland cement. However, since the blend costs less to

manufacture than cement clinker, its use offers the cement maker a relatively cheap method of extending capacity. Many clinker grinding plants in Europe are located at steel works.

Table 56 outlines the variations in 1976 within EEC and the USA in the reliance of cement makers upon blended cement:

Table 56 The Product Profile of Cement in 1976

Country	Pure cement %	Blended cement %
Belgium	70	30
Denmark	100	0
France	31	62
W. Germany	73	27
Irish Republic	100	0
Italy	58	41
Luxembourg	4	96
Netherlands	41	59
United Kingdom	97	3
USA	97	3

(Source: Cembureau; U.S. Bureau of Mines : The Price Commission supra p.43)

Inevitably, with such variations in product profile between countries, the strength characteristics of the various national outputs of cement differ. In 1975, for example, over 70 per cent of cement output both in France and in Germany was in the normal grade, much of it slag cement. By contrast, in the UK in the same year, only 0.13 per cent was 'normal', all of it slag cement, the remainder being 'high grade' 85 per cent, 'very high grade' 5 per cent, and other special categories, just under 10 per cent. None of these higher grades in the UK utilised slag in a blend.

The Price Commission, in its 1978 Report, suggested that a gap existed on the UK market for a blended cement of 'normal' strength. Whilst not denying that the availability of raw materials might be an important reason for the differing outputs in the UK and the rest of Europe, and whilst recognising the relative absence of pressure from the steel industry in the UK, the Commission concluded, nevertheless, that cement consumers in continental Europe had a greater choice than in the UK both with respect to cement grades and to cement prices. If relative continental European costs were any guide, the Commission considered that it should be possible to sell a blended cement in the UK at lower prices than pure Portland cement, thus providing a means of extending cement production capacity relatively cheaply whilst also conserving energy resources, the latter estimated at 22.5 per cent in total energy savings per tonne of cement.

It is not our task, in this study, to enter into policy discussions of this kind. But it is perhaps noteworthy that the large cost savings attributed to blended cements have not enabled European cement manufacturers to gain even a foothold in the UK cement market, let alone to make a major penetration. Consumer preferences in favour of pure Portland cement may be more pronounced in the UK than in other European countries.

4. Alternative Cement Making Processes

Relative to most other countries in the EEC, and to the USA, the UK cement industry is distinctive by its low utilisation of less fuel-intensive and cheaper dry and or semi-dry production processes. Table 57 outlines the 1976 position.

Moreover, the rate at which dry and semi-dry process capacity has been substituted for wet process capacity following the substantial increase in energy costs in 1973, is also somewhat lower in the UK than in other cement producing countries as Table 57 outlines.

Table 57 The Proportion of Dry and Semi-Dry Capacity in Cement Manufacture 1976

Country	Proportion of Dry and Semi-Dry Capacity
Belgium	n.a.
Denmark	0
France	72
Germany	89
Irish Republic	24
Italy	87
Luxembourg	100
Netherlands	44
United Kingdom	36
USA	47

(Sources: Cerembureau; US Bureau of Mines; The Price Commission supra p.43)

Table 58 Rates of Substitution of Dry and Semi-Dry for Wet Capacity 1971-78

Country	Percentage of Capacity in Dry/Semi-Dry Processes			Change 1971-78 % Points
	1971 %	1976 %	1978 %	
Fed.Rep.of Germany	63	82	94	+31
France	51	69	71	+20
USA	40	48	48	+ 8
UK	31	36	36*	+ 5

* 1977 statistic

(Source: Cembureau: The Price Commission supra p.39)

The Price Commission estimated that, by the end of 1978, the Federal Republic of Germany would have converted almost entirely to the cheaper processes, that France would have converted three-quarters of its capacity and that the USA nearly one-half, whereas the UK would still produce the greater proportion of its cement via high cost processes. Although no explicit criticism of UK performance in this respect was enunciated in its Report, the implicit criticism clearly is apparent.

However, as the Commission itself noted, continental Europe had experienced an impetus towards converting kilns to the cheaper process, via rising cement demand and rising fuel prices in the late 1960's and early 1970's, which was not available to UK cement producers owing to economic stagnation and subsidised fuel policies. Since 1973, the recessed conditions in the cement market have made it extremely difficult for UK producers to contemplate major investments. Indeed, it would be unprofitable to engage in such exercises unless the average variable costs of the existing plant exceeded the average total costs of the new under short-run conditions. Finally, as we emphasised in Chapter 2, the availability of raw materials is an important influence on the choice of production process. The relative prevalance of suitable materials (limestone and shale) in contental Europe further explains the relative speed of adjustment of cement makers in those countries to the dry and semi-dry processes.

5. Plant Size and Scale Economies

The high rate of investment in cement capacity in continental Europe in recent years, stimulated by pressures to convert to dry and semi-dry processes, has enabled producers in those countries to take advantage of scale economies which arise from recent technical progress. Although the average annual kiln capacity of dry kilns (Germany and the USA excepted) is larger for the dry than for the wet kilns, equivalent scale economies

appear to be available for wet kilns of comparable sizes. The difference in average capacity reflects essentially the differing age structures of dry and wet plants. Table 59 outlines the situation in 1976:

Table 59 The Number of Kilns and Capacity of Average Kiln 1976

Country	Number of Kilns			Capacity of Average Kiln	
	Dry	Wet	Ver	Dry	Wet
				'000 tonnes per annum	
Belgium	5	13	3	n.a.	n.a.
Denmark	0	10	0	0	26
France	60	35	26	400	210
Germany	98	11	36	423	385
Irish Republic	1	8	0	400	158
Italy	136	27	16	306	179
Luxembourg	1	0	0	175	0
Netherlands	1	3	0	750	315
United Kingdom	18	64	0	383	188
USA	176	211	0	224	200

(Sources: Cembureau; U.S. Bureau of Mines. The Price Commission supra p.43)

It is evident from this Table that the UK cement makers, on the average, do not reap the scale economies available to their major EEC counterparts. Once again, however, it is noteworthy that any cost advantages accruing fail to offset the freight costs that would be incurred by EEC manufacturers if they attempted to penetrate the United Kingdom cement market.

6. Labour Productivity

Cross-country comparisons of labour productivity, utilising crude information as to numbers employed are notoriously misleading and we outline

in Table 60 the comparative figures for the UK, continental Europe and the USA principally to emphasise their inadequacy as any measure of economic performance:

60 Average Output per Employee in Cement Production (1976)

Country	Average output per employee '000 tonnes per annum
Belgium	2.24
Denmark	1.18
France	2.89
Germany	2.73
Irish Republic	1.55
Italy	2.49
Luxembourg	1.91
Netherlands	3.08
United Kingdom	1.36
USA	n.a.

(Sources: Cembureau and US Bureau of Mines: The Price Commission supra p.43)

The Price Commission, in analysing the apparently poor performance of UK cement producers, as depicted in this Table, noted that the difference in kiln size and the higher rate of investment in more efficient plants were factors with a strong influence on labour productivity. Another was the relative importance of blended cement. Another factor explaining some part of the difference in labour productivity in France and Germany as compared with the UK might be differing proportions of plant operatives to total employees, and the inclusion of transport staff in the totals.

Notwithstanding these reservations, the Price Commission's treatment of labour productivity as any measure of performance is naive and unsatisfactory

To analyse cross-country productivity performance in any meaningful sense requires a total factor productivity approach - with output simultaneously related to inputs of labour, capital employed and energy as well as various raw materials, each suitably weighted - with all information defined in comparable form. Such an exercise itself is beyond the scope of this study (and presumably also that of The Price Commission). Even such a measure is useless, if employed in countries with a varying degree of recession, as was the case in 1976. For in such circumstances, all that might be meausred is the ability of companies to lay off various inputs. Ideally, a suitably formulated total factor productivity index, measured at a simultaneous cycle peak across countries would offer some insights into comparative productivities. No such set of indices is available at the present time for cement production.

7. Prices

Comparisons of commodity prices in different countries are almost impossible to make because of variations in product specification, differences in market conditions, varying degrees of government price control, and volatile movements in the rates of currency exchange. For these reasons, we have attempted no such comparison. Despite its limited meaning, however, we reproduce here a set of price movements in selected countries over the period 1973-77, outlined in the 1978 report of The Price Commission. Table 61 outlines the situation.

It is clear from Table 61 with all its deficiencies that the internal rate of inflation and the rate of increase of cement prices are related and that, with the exception of the Netherlands, cement prices rose more quickly between 1973 and 1976 than consumer prices in general. The latter phenomenon must be largely explained by the dramatic increase in energy prices over that period.

Table 61 Price Movements of Cement in Selected Countries 1973 - 77 (1973 = 100)

Country	1974	1975	1976	1977	1976 relative to 1973[6]	
					Consumer prices	Wages and salaries
UK[1]	114	160	197	235	167	183
France[2]	138	150	164	174	139	161
USA[3]	118	141	156	166	132	127[7]
Netherlands[4]	107	123	128	129	132	146
West Germany[5]	116	124	123	n.a.	119	129

(Sources: 1. Business Statistics Office

2. Average for 1 company

3. Council on Wage and Price Stability Study of Cement Prices

4. Central Bureau of Statistics

5. Bundesverband der Deutschen Zementindiztrie

6. OECD Main Economic Indicators

7. Gross earnings of production workers

The Price Commission supra at p.40)

Chapter 10 COMPANY PROFILES

(i) Associated Portland Cement Manufacturers (APCM)

APCM is the largest of the UK cement manufacturers, having approximately 60% of the domestic market. It is the parent company of the Blue Circle Group, an international group of companies principally concerned with the manufacture of cement and allied products, the extraction of gravel and other minerals, paint manufacture and the merchanting of building materials. A wide range of APCM's products, including cement, are marketed under the "Blue Circle" brand label.

In 1977, APCM's total turnover was £370.8 million. Approximately 25% of sales and 50% of pre-tax profits were contributed by overseas companies. Sales revenue from UK cement operations was £206.8 million.

Since the beginning of 1977, APCM has been split into four independent operating units, co-ordinated by corporate headquarters. The units and their functions are as follows:

(a) Blue Circle Cement UK (BCC)

Production, sales and distribution of basic cement products from UK plants (including exports). Also produces and sells on behalf of BCE (see below) some non-cement products. About 97% of BCC sales and profits are due to cement products.

(b) Blue Circle Enterprises (BCE)

Production and marketing of non-cement products (e.g. plaster, flints, bricks, industrial minerals, etc.), land and property development, investments in aggregate production and builders merchants.

(c) Blue Circle Technical (BCT)

Research and development, engineering services, geological services, etc.

(d) Blue Circle Overseas (BCO)

Manages the company's overseas investments and operations and its overseas consultancy operations.

APCM Organisation

Board of

Directors

Managing

Director

Headquarters Staff

Finance Personnel Legal Public Relations

Blue Circle	Blue Circle	Blue Circle	Blue Circle
Cement UK	Enterprises	International	Technical

the operating units

In 1977 the breakdown of sales and profits between the four operating units was as follows:

Table 62

Unit	Group sales (including share of associated companies) £m	Profit before interest and tax	
		£m	as % of sales
BCC	230.5	29.1	12.6
BCE	48.4	2.3	4.8
BCT	-	(3.6)	-
Total UK units	278.9	27.8	10.0
BCO	167.3	23.4	14.0
Total	446.2	51.2	11.5

The figures suggest that margins are higher abroad than in the UK, and this conclusion is supported by statistics taken from the company reports for earlier years which show the following:

Table 63 Trading profit as a % of turnover

Year	Parent company and home subsidiaries	Overseas subsidiaries
1973	12.4	17.0
1974	5.2	17.1
1975	11.1	10.7
1976	8.6	9.1
Average '73 - '76	9.3	13.5

The number of UK cement producing works operated by APCM in 1978 was 16. This represents a substantial reduction over the last ten years, the company having produced cement at 33 works in 1968. Since the beginning of the

decline in the UK market in 1973 four works have been closed, one in 1975 and three in 1976. In addition kilns having a total capacity of 0.5 million tonnes per annum have been taken out of action. Ten of the sixteen works operate on the basis of the wet-process and six utilise dry or semi-dry techniques. At the time of writing the annual capacity of the wet-process plants is estimated at 7.5 million tonnes, which includes the giant Northfleet works. The latter is the largest cement plant in the UK with an annual capacity of some 3.9 million tonnes, approximately 32% of APCM's total capacity. Dry process works have been introduced by the company since 1965. In 1978 APCM's dry and semi-dry works had a capacity of around 5.0 million tonnes per annum.

APCM is the only UK cement company to provide coverage of the full national market, although its market share varies from region to region. For example, it dominates in Northern Scotland (100%), Northern Ireland (100%) and much of the West Country (90+%), whereas in South Wales and Northamptonshire it holds less than 20% of the market. Substantial shifts in APCM's market shares in the various subregions have occurred over the past ten years, although its overall position in the national market has remained relatively stable.

Aspects of the recent performance of APCM are shown in tables 64 and 65 In interpreting the figures for profits and capital employed, the following statements regarding accounting policies taken from the 1976 company report and accounts are particularly important.

> "Valuation of Fixed Assets. The accounts of the UK companies are prepared on a depreciated replacement basis, the fixed assets of the companies being revalued at regular intervals. The cost of plant as new is assessed at the date of valuation and that cost is reduced in respect of the expired life of the plant. The life expectancy of the plant is reviewed at each valuation date and assets disposed of are also valued prior to their sale. Surpluses and deficits arising at the time of valuation are transferred to fixed assets replacement reserve, except that any loss on disposal against written down original cost is charged to profit and loss account."

Table 64 Recent Performance of the APCM Group

Year	Profit before tax and interest as a % of		Exports as a % of turnover	Average remuneration per UK employee
	Capital employed	Turnover		
1965	11.0	12.2	n.a.	n.a.
1966	13.6	17.2	n.a.	n.a.
1967	14.0	17.5	2.7	1240
1968	11.6	15.4	2.4	1320
1969	8.7	12.9	2.5	1395
1970	9.0	14.3	3.6	1588
1971	12.0	17.4	3.4	1819
1972	11.9	17.6	4.0	2087
1973	13.1	18.0	5.8	2324
1974	7.4	13.7	6.2	2758
1975	11.8	17.2	5.4	3588
1976	10.7	14.5	6.5	4033

Table 65 APCM : sales and profits from UK cement production

Year	UK: Ordinary Portland cements	UK: Special and other cements	Exports	Total
		Sales (£m)		
1973	99.1	11.7	8.5	119.3
1974	100.0	11.3	8.5	119.8
1975	135.2	15.6	8.3	159.1
1976	150.6	17.1	12.9	180.6
1977	161.9	18.9	26.0	206.8
		Profit before interest and tax (£m)		
1973	14.1	-0.1	0.3	14.3
1974	5.5	-0.9	0.7	5.3
1975	17.7	0.0	0.4	18.1
1976	18.1	-1.0	0.6	17.7
1977	17.6	-1.5	1.5	17.6
		Profit before interest and tax as a % of sales		
1973	14.2	-0.9	4.1	12.0
1974	5.6	-8.4	7.7	4.4
1975	13.1	0.2	4.4	11.4
1976	12.0	-5.8	5.0	9.8
1977	10.8	-7.8	5.8	8.5

"Depreciation. Depreciation is charged from the date of original use or subsequent valuation by equal annual amounts over the estimated annual lives of the assets, except that, where applicable, it is provided on the basis of tonnage extracted from freehold and leasehold land.

In the company, its subsidiaries and principal associates, an additional depreciation charge is made in the profit and loss account and transferred to fixed assets replacement reserve. This additional charge represents the increase in fixed assets replacement costs from the date of the last valuation or acquisition, as appropriate, to the mid-point of the year. There has been a change in policy in so far as in previous years no additional depreciation was provided in subsidiaries and associates."

The major revaluations of assets during the period of interest occurred at 1st January 1969 and 1st January 1974.

It should also be noted that the capital employed figures used in table 65 have been calculated by adding back bank loans and overdrafts to the net assets/capital employed figures shown in the statutory accounts. This has been done to yield an adjusted figure more appropriate for use in assessing company performance.

It appears from the first two columns of table 65 that profitability has held up relatively well in the last few years with the exception of 1974. The fall in that year of the profit:sales margin was largely due to the steep fall in UK cement demand. Note that the profit:capital ratio falls more dramatically than the margin on sales due to the asset revaluation mentioned above (a similar point holds for the 1969 figures). However, these aggregate statistics mask some important features of the company's performance. Comparing tables 64 and 65 it can be seen that APCM's margins on UK cement products have been significantly lower than those on its other products. Figures prepared by the company for the Price Commission showing the return on capital employed in APCM's UK cement making activities confirm that the profitability of these operations has been relatively low in recent years. The relevant table is:

Table 66

Year	Profit before interest and tax as a % of capital employed	
	With fixed assets as shown in the statutory accounts	With fixed assets at replacement cost
1973	9.5	7.0
1974	2.5	2.0
1975	8.5	5.9
1976	8.3	5.1
1977	7.7	4.6

Thus from 1973-77 the company's average cement return in the UK averaged about 7% on the statutory accounts basis, about a third less than for the Group as a whole. With fixed assets valued at replacement cost, however, the average rate of return was only 4.9%.

Turning to exports, APCM's performance in highly competitive markets has been good in the recent past. Exports of cement stood at approximately 1.0 million tonnes in 1976 and reached 1.75 million tonnes in 1977 (16.8% of total sales from the company's UK plants).

Finally, it may be noted that the average remuneration of APCM's UK employees in 1976 was the highest of the major companies, although the differences are not very great.

(ii) Rugby Portland Cement Company Ltd

The Rugby Portland Cement Company is the second largest supplier of cement in the UK, with about 15% of the total market. In the UK its cements are sold under the "Crown" brand label, and overseas under the "Bulldog" label. Its market share has risen steadily over the past ten years, climbing from 13% of the supply of Portland cement (the principal product) to 15.5% in 1977.

With two exceptions, Rugby Portland's operating subsidiaries are engaged in activities ancilliary to the manufacture and distribution of cement. The exceptions are (a) Mill Properties Pty. Ltd. which owns and operates a hotel in Western Australia, and (b) The Rom River Company Ltd. which designs, fabricates and fixes steel reinforcement. The relative importance of these secondary activities is shown in the following table which provides a breakdown of turnover and profit in 1976 (figures in thousands).

Table 67

	Group Turnover			Group pre-tax profit
	UK & exports	Overseas	Total	
Cement & lime	42703	15485	58188 (75%)	10369 (90%)
Reinforcement	16659	-	16659 (21.5%)	1190 (10.3%)
Hotel	-	2715	2715 (3.5%)	-32 (-0.3%)
	59362	18200	77562 (100%)	11527 (100%)

The Rom River Company was acquired in 1968 and Rugby Portland have been involved in no major take-overs since then. At the time the Chairman was anxious to point out that the acquisition did not mark the beginning of a period of diversification or forward vertical integration:

> "I do not want to give the impression that this acquisition marks the start of a period of diversification. We do not believe in diversification for the sake of diversification, neither do we share the view of so many politicians of all parties that size is a guarantee of economy and efficiency. All too often it produces neither.
>
> Steel reinforcement is so closely allied to cement in its use in constructional work that the extension of our activities into this field can scarcely be called diversification. Further, we have always turned our face against competing with our own customers, a policy which we believe has certainly been appreciated by at least the larger users of our cement. This does not arise in the case of Rom River." (from the Chairman's speech, AGM, 1969).

In 1976 overseas operations accounted for 23.5% of the total turnover of the Rugby Portland Group, but their contribution to pre-tax profits was

was not revealed in the annual report. However, figures given in earlier years suggest that profit margins have been significantly higher than in the UK (see table 67). For example, in 1973-75 overseas turnover averaged about 24% of the group total whereas the overseas contribution to pre-tax profits averaged approximately 36%. The principal overseas subsidiary is Cockburn Cement Ltd. which is located in Western Australia and in which the parent company has a 85% stake. Until 1976 Rugby also operated in Trinidad through Trinidad Cement Ltd., but this latter company was nationalized in August that year.

In the UK Rugby produces cement in seven plants at the following locations:

Barrington, Cambridgeshire

Chinnor, Oxfordshire

Lewes, Sussex

Rochester, Kent

Rugby, Warwickshire

Southam, Warwickshire

South Ferriby, Lincolnshire

From these plants the company supplies to a market area covering Yorkshire, Eastern England, the Midlands and the South of England. In recent years a new semi-wet process kiln has been built at Rochester and at Southam conversion from a wet to a semi-wet process has taken place. With the exception of the semi-dry plant at South Ferriby, all the company's other kilns use the wet process of cement manufacture.

Some aspects of Rugby's performance over the last twelve years are shown in table 68. In interpreting the profitability figures, the accounting conventions used by the company should be born in mind. Fixed assets are valued at cost (with the exception of relatively unimportant revaluations of certain assets in 1966 and 1973) and are depreciated on a straight line

Table 68 Rugby Portland Cement : breakdown of sales, employment, profits and margins, 1971 - 76

Year	% of turnover accounted for by cement and lime products	% of UK employment accounted for by cement & lime products	% of turnover from overseas operations	% of pre-tax profits from overseas operations (approx.)	Pre-tax profit as a % of turnover on:	
					cement & lime	reinforcement
1971	73.7	74.9	22.5	n.a.	24.6	9.3
1972	75.9	76.0	25.5	n.a.	24.5	9.9
1973	70.3	73.5	25.4	40	21.0	12.2
1974	61.5	73.0	22.7	39	17.9	8.8
1975	72.1	76.9	24.1	28	17.7	7.1
1976	75.0	n.a.	23.5	n.a.	17.8	7.1

basis over their estimated useful lives (excepting unquarried freehold land on which no depreciation is provided). In the inflationary period of the nineteen seventies it is therefore likely that the capital employed estimates are seriously biased downward, so the first column of the table should be treated with caution. It is clear from the second column that, compared with the other companies, Rugby earns a relatively high margin on sales, though this has been squeezed in the last few years by the downturn in the UK demand and by poorer results from the Australian subsidy. The fact that the return on capital has fallen less since the early seventies than the margin on sales is probably due to the increasing undervaluation of assets in the accounts.

The profits to sales figures shown in table 69 are in fact an understatement of the profit margin on cement products, as can be seen from the last two columns of table 68. These are not strictly comparable with those in table 68 since interest payments have been deducted from profit before the ratios are calculated (the accounts and company reports do not quote figures for the ratio of profit before taxation and interest to sales on cement and lime). However, it is clear that the margin on cement and lime is considerably above that obtained from the activities of Rom River. Allocating the interest payments of the company between its activities in proportion to sales yields a ratio of profit before interest and tax to turnover of 19.8% in 1976 for cement and lime operations, the highest of the major companies.

Exports by Rugby are relatively modest, averaging about 1% of turnover during the last five years, although there has been a significant increase since 1973 in line with the growth of the world cement export trade in the mid-seventies.

Table 69 Recent Performance of Rugby Portland Cement

Year	Profit before interest and tax as a % of		Exports as a % of turnover	Average remuneration per UK employee(£)
	Capital employed	Turnover		
1967	13.0	26.0	n.a.	n.a.
1968	11.3	22.2	0.8	1350
1969	12.1	21.6	1.0	1430
1970	13.5	21.6	0.9	1576
1971	16.9	24.0	0.8	1725
1972	15.9	23.5	1.0	1912
1973	15.1	20.8	0.6	2187
1974	15.1	17.9	0.7	2587
1975	14.9	17.7	1.2	3234
1976	14.5	18.1	1.4	3652

Note: The denominator used in the first column was calculated by adding back bank overdrafts to the capital employed figures given in the statutory accounts.

(iv) Aberthaw and Bristol Channel Portland Cement Company Ltd

Aberthaw Cement is one of the three smaller UK manufacturers, principally supplying in the South Wales area where its plants are located. The company's share of national Portland Cement output increased from approximately 4% in 1968 to around 5% in 1977. One significant increase in the demand for Aberthaw's output occurred in 1969 and 1970 following the closure of the works at Penarth in Wales by APCM and an agreement that the latter would, over a long term, purchase its cement requirements in this area from Aberthaw.

Aberthaw's principal activities are the manufacture of cement and the merchanting of builders materials. It has four wholly owned subsidiary companies, all incorporated in the U.K. They are:

(a) T. Benyon and Company Ltd

Acquired in 1976, this company acts (and acted before 1976) as Aberthaw's sole sales agent. Prior to acquisition it was controlled by the joint managing directors of Aberthaw.

(b) Davies Brothers (Deebee) Ltd

A firm of builders merchants, acquired in 1972, operating in the South wales area.

(c) W.B. Harrison and Son (Builders Merchants) Ltd

A smaller firm of builders merchants acquired by Davies Brothers in October 1973.

(d) Ruthin Quarries (Bridgend) Ltd

A non-trading company supplying raw materials to Aberthaw. Prior to 1971 Aberthaw held 50% of the issued capital of Ruthin, but during that year acquired the remaining shares thus making it a wholly owned subsidiary.

In 1976 cement manufacture accounted for about 85% of the total sales and 95% of the pre-tax profits of Aberthaw. Sales, profits and margins on sales for the two principal activities of the company are shown in table 70,

Aberthaw procudes cement at two plants: East Aberthaw, Glamorgan and Rhoose, Glamorgan. There are two dry process kilns at Aberthaw but the Rhoose works, with older equipment, consists of wet process kilns. The first of the dry process kilns was brought into operation in 1967 and represented a considerable gamble for the company due (a) to the newness of the technology, and (b) to the size of the kiln which, with an annual capacity of 350,000 tons, could potentially handle about 50% of Aberthaw's output at the time. After early teething troubles following installation, the fuel savings made possible by the dry process have obviously been increasingly valuable as fuel costs have risen. Thus, construction on a second dry process kiln was started at Aberthaw in 1973 and the new plant came fully into operation in 1976.

The movement of the return on capital and the margin on turnover for the company during the past ten years is shown in table 71. These figures were abstracted from the accounts constructed by the company on a "historic cost" basis. That is, fixed assets are valued at cost and then depreciated according to the conventions used by the company. In the 1976 company report these were stated as follows:

> "Works, including Buildings, Roadways, etc., Plant and Machinery and Vehicles:
> These assets are being depreciated on a straight line basis over their estimated lives, with the exception of assets acquired prior to 30th June, 1948, the book value of which at 31st December, 1976, was £112,000. The Directors are of the opinion that these assets may be expected to contribute to the earnings of the Company for many years and no provision for depreciation is considered necessary at the present time."
>
> "Freehold Land and Buildings:
> Land currently being quarried, other than that wholly written off at 1st January, 1976, is being depreciated according to the quantity of stone extracted. The remaining land and buildings are not being depreciated."

Table 70 Aberthaw cement : breakdown of sales, profits and margins

Year	Cement Manufacture	Builders Merchants	Total
	Sales (£ thousands)		
1972	7500	1144	8644
1973	8077	1527	9604
1974	8070	1949	10018
1975	11310	2009	13319
1976	13235	2312	15547
	Profit before tax (£ thousands)		
1972	1154	69	1223
1973	1057	92	1149
1974	949	136	1085
1975	1573	69	1642
1976	1590	87	1677
	Pre-tax profit as a % of sales		
1972	15.4	6.0	14.1
1973	13.1	6.0	12.0
1974	11.8	7.0	10.8
1975	13.9	3.4	12.3
1976	12.0	3.8	10.8

Table 71 Recent Performance of Aberthaw Cement

Year	Profit before tax and interest as a % of		Exports as a % of turnover	Average remuneration per employee (£)
	Capital employed	Turnover		
1967	11.8	11.9	-	1322
1968	13.3	14.6	-	1451
1969	12.4	13.7	-	1552
1970	18.4	16.2	-	1833
1971	21.5	15.4	-	1981
1972	20.4	14.9	-	2145
1973	12.7	12.5	-	2340
1974	10.2	11.5	-	2806
1975	15.6	15.0	-	3645
1976	16.1	14.2	-	4018

Note: Bank overdrafts and acceptance credits have been added to the capital employed figures given in the statutory accounts to obtain the denominators used in column 1.

The table suggests that the profitability of Aberthaw's operations has held up relatively well during the mid-seventies' recession. The major fall in the rate of return on capital between 1972 and 1973 was largely due to a substantial rise in bank borrowing connected with the financing of the new dry process kiln, the construction of which started in the latter year. This rise in borrowing inflated the capital employed figures (while the new plant did not start to contribute significantly to profits until 1976) thus leading to a temporary fall in the rate of return.

Since 1975 Aberthaw has, in addition to its "historic cost" accounts, also published a series of fairly detailed accounts in the annual report constructed on a "current cost" bases. It is therefore of interest to compare the results obtained from the two sets of accounts and thereby gain some insight into the likely consequences of inflation for the interpretation of the "historic" figures. Unfortunately it is not possible to calculate the level of profit before taxation and interest from the current cost data, so we are restricted to considering the ratios of pre-tax profit to capital employed (unadjusted) and to turnover. The statistics shown below have been calculated from the information given in the 1976 company report.

Table 72

Year	Pre-tax profit as a % of			
	Capital employed		Turnover	
	Historical basis	Current cost basis	Historical basis	Current cost basis
1975	14.7	7.0	12.6	10.5
1976	13.5	5.9	11.0	9.2

The dramatic impact of the accounting procedures on the rate of return figures indicates the unreliability of the first column of table 72 when used

as a measure of performance. Thus, despite the reasonably high figures for the "historic" rate of return on capital in 1975 and 1976, it appears that when some allowance is made for the effects of inflation Aberthaw turns out to be operating at a rather low level of profitability.

For the period covered by table 71 Aberthaw was not involved in the export trade. However, with excess capacity resulting from the recession, an overseas contract was negotiated in 1977 against strong international competition and during the year exports reached 90,000 tonnes, well in excess of 10% of output.

Finally, although average wages in the UK industry tend to be positively related to firm size, it is worth noting that the remuneration of Aberthaw's employees compares very favourably with that of workers in the larger companies.

(iii) Tunnel Holdings Ltd

The principal activities of this group, through its subsidiary companies in the UK and abroad, are the manufacture of cement and allied products for the building industries. Tunnel is the third largest supplier of cement in the UK with around 10% of the Portland Cement market. The company has faced serious operating difficulties during the past ten years and has seen its market share drop from approximately 13½% in 1968.

Following reorganisation in the mid-seventies the parent company is now essentially a holding company with a large number of operating subsidiaries and associates, the latter being defined as firms in which Tunnel has a minority stake of at least 20%. A full list of Tunnel's major subsidiaries, associates and trade investments as at the middle of 1977 is shown in Table 74. Table 73, which shows the percentage of turnover and profits (before debenture interest, tax and exceptional items) accounted for by associated companies, trade investments and other net lending, illustrates the heavy dependence of the Group on these investments:

Table 73

Year	Percentage of turnover from associated companies	Percentage of profit from		Interest receivable less payable	Total
		Associated companies	Other investment income		
1972/3	21.4	20.0	2.6	4.5	27.0
1973/4	33.4	24.9	4.8	22.1	51.7
1974/5	40.4	35.6	3.6	15.9	55.1
1975/6	35.3	26.7	3.0	11.7	41.4
1976/7	36.6	36.0	3.2	15.8	55

Thus it can be seen that since 1973 these "outside" sources of income have been contributing about 50% of Tunnel's profits.

Tunnel produces cement in the UK at three works located at Pitstone (Bedfordshire), Padeswood (Flintshire) and Gartsherrie (Lanarkshire). The Gartsherrie plant is purely a cement grinding works and does not produce clinker. There is one dry process kiln at each of Pitstone and Pudeswood, together with older wet process plant. Due to low profitability the company has, since 1974, closed down a grinding works at Clydebank (Dunbartonshire) and the large West Thurrock plant in Essex. In addition, as part of a cost saving operation, the company shifted its central office in 1974 and closed down a kiln at Pitstone. The fall in market share in 1973 (to 11½% from 13% in the previous year) which occurred before these closures appears to have been partly due to serious labour problems which the company then faced (one major and several minor strikes in 1973).

Performance figures for Tunnel Holdings from March 1967 to March 1977 are shown in table 73. The relevant accounting conventions (as at March 1977) are as follows:

Fixed Assets Certain freehold buildings were valued at 2nd April 1972 and subsequently included at their revalued amounts. All other fixed assets are

Table 74 Prinicpal Subsidiaries and Investments of Tunnel Holdings

Country of Incorporation		Principal Activity
SUBSIDIARIES		
UK	Clyde Cement Ltd	Cement sales
	Compo-Cem Ltd (60%)	Glass reinforced cement sheeting products
	Flintshire Quarries Ltd	Limestone sales
	Hundred and Five Piccadilly Ltd	Property investment
	Stablex (UK) Ltd (84%)	Waste management
	Tunnel Building Products Ltd	Asbestos cement products
	Tunnel Cement Ltd	Cement sales
	Tunnel Cement (North Western) Ltd	Cement manufacture
	Tunnel Cement (Scotland) Ltd	Cement manufacture
	Tunnel Cement (West Thurrock) Ltd	Cement manufacture(part year)
	Tunnel Cement Investments Ltd	Property investment
	Tunnel Industrial Services Ltd	Site management & services
	Tunnel Trading Ltd	Mineral/oil sales
Australia	Tunnel Cement Investments Pty. Ltd.	Investment holding company
Cyprus	Cyprus Trading Corporation Ltd(59.3%)	Caterpillar tractor agency
Jersey	Tunnel Holdings (Jersey) Ltd	Investment management
Switzerland	Stablex A.G. (84%)	Waste management
ASSOCIATED COMPANIES		
UK	Cyprus Asbestos Ltd (25%)	Asbestos fibre agency sales
	Go-Con Concrete Ltd (40.9%)	Concrete machinery
	Ribblesdale Cement Ltd (50%)	Cement manufacture
	Stablex Ltd (50%)	Waste management
Australia	Metro Industries Ltd (37.2%)	Industrial holding company
Cyprus	Cyprus Asbestos Mines Ltd (25%)	Asbestos mines
OTHER TRADE INVESTMENTS		
Eire	Cement - Roadstone Holdings Ltd (3.6%)	Industrial Investment Holding Company
UK	Erith and Company Ltd (10.32%)	Builders merchants

stated at cost, less government grants.

Depreciation Freehold land is not depreciated; leasehold land and buildings are written off over the period of the lease. Depreciation on freehold buildings and all other fixed assets is provided on a straight-line basis at rates which will completely write off the cost or valuation of the assets by the end of their estimated useful lives.

Investments Investments in associated companies are shown in the (consolidated) balance sheets at cost less amounts written off plus the Tunnel Group's interest in the associates' post-acquisition retained earnings, based on their latest available accounts. Quoted investments are stated at cost.

Because of Tunnel's extensive investments the figures are rather difficult to interpret, although the effects of the downturn in cement demand during 1974 on profitability are fairly clear. Given the company's operating difficulties over the period it may be inferred that the rates of return and profit margins shown in the table overstate the profitability of its cement activities. Unfortunately, it is not possible to derive accurate estimates of the latter from the published data, although a closer approximation can be obtained by calculating the ratio of pre-tax profit (excluding investment income and interest received, interest payable, exceptional items and profits of associated companies) to group turnover (not including the share of sales of associated companies). The results yielded by this exercise are as follows:

1967/68	13.0%	1971/72	12.6%	1975/76	11.2%
1968/69	11.0%	1972/73	16.0%	1976/77	8.5%
1969/70	6.8%	1973/74	8.8%		
1970/71	8.0%	1974/75	7.5%		

The erratic nature of the returns and the fall in profitability in 1973 are clearly visible from these figures.

Table 75 Recent Performance of Tunnel Holdings

Year	Profit before tax and interest as a % of		Exports as a % of turnover (including share of sales of associated companies)	Average remuneration per UK employee (£)
	Capital employed	Turnover		
1967/68	11.6	16.3	1.0	1259
1968/69	9.1	14.0	0.7	1313
1969/70	7.1	11.1	1.4	1388
1970/71	9.0	10.3	1.7	1626
1971/72	14.1	15.6	0.7	1867
1972/73	15.6	17.3	0.5	2157
1973/74	13.8	13.5	2.6	2322
1974/75	11.7	9.7	2.0	3036
1975/76	16.9	12.6	5.5	3698
1976/77	16.1	12.7	2.5	3950

Notes (i) Tunnel's financial year ends in the last week of March

(ii) Bank overdrafts and advances have been added back to the capital employed figures published in the statutory accounts to obtain the denominators used in column 1.

Like the other companies, Tunnel has tended to increase its export level in the last five years, stimulated by both the general increase in the export trade and excess capacity in the UK. According to the Chairman's review in 1975 the contracts for clinker exports in 1975 and 1976 were gained at very low margins and were accepted simply to maintain production and prevent more severe cutbacks.

(v) The Ketton Portland Cement Company Ltd

Since 1973 Ketton has been a wholly owned subsidiary of T.W. Ward Ltd and therefore the usual type of company report and accounts is not now available for the company. Data available up to 1972 indicates a relatively prosperous company, as can be seen from the ratio of net profits before interest and tax (excluding profit of the Ribblesdale subsidiary) to turnover:-

Table 76

Year ended June 30	Profit/turnover
1968	15.1%
1969	13.6%
1970	17.7%
1971	18.9%
1972	21.2%

Ketton produces cement from a single plant in Sheffield. It has expanded its market share for Portland Cements from 3½% in 1968 to 5% in 1977 and has recently (1978) raised its capacity by 14%. The company has not diversified into non-cement activities and does not export.

(vi) Ribblesdale Cement Ltd

The company is jointly owned by Tunnel and Ketton and therefore does not publish a report and accounts. It is concerned solely with cement manufacture and operates from a single plant at Clitheroe, Lancashire, chiefly supplying markets in the North of England. Ribblesdale's share of the UK Portland Cement market has risen from 4% in 1968 to 5½% in 1977 and, judging by the references to its performance in the annual reports of Tunnel, it is a relatively profitable company. Capacity at the Clitheroe plant has expanded from 800,000 tonnes per annum in 1967 to 1,150,000 tonnes in 1977. Ribblesdale does not export any of its output.

Appendix 1. Summary of Data from Company Reports and Accounts

This appendix contains data extracted from company reports and accounts for the following variables:

Turnover (including share of associated companies where given)

Capital employed (= fixed assets and investments and net current assets)

Numbers employed in the UK

Wages and salaries in the UK

Net profit (i.e. profit before interest and tax)

Gross cash flow (= net profit and depreciation)

Net cash flow (= gross cash flow - taxation)

In addition a table is given showing the estimated turnover each company derives from its sales of cement to the UK market. The figures have been obtained in the following ways:

Aberthaw

Up to and including 1971 the company was concerned entirely with cement manufacture and therefore total turnover is the same as revenue from cement. After 1971 the company has published its sales revenue from cement in the annual report. Since there were no exports during the period these figures measure the turnover from UK cement sales and no further adjustments to the statistics are necessary.

APCM

Figures for APCM's sales revenue from cements supplied to the UK market since 1973 are available from the Price Commission Report. Estimates prior to 1973 have been derived as follows:

Let q_1 = tonnes of cement supplied to UK market by APCM

q_2 = tonnes of cement supplied to UK market by Aberthaw

p_1 = average price per tonne of APCM's UK sales

p_2 = average price per tonne of Aberthaw's UK sales

S_1 = APCM's turnover on sales of cement in the UK = $p_1 q_1$

S_2 = Aberthaw's turnover on sales of cement in the UK = $p_2 q_2$

Now $$\frac{S_1}{S_2} = \frac{p_1}{p_2} \cdot \frac{q_1}{q_2}$$

and since figures for S_1 and S_2 are available from 1973, the price ratio can be estimated if q_1/q_2 is known. But q_1/q_2 can be estimated from the market share data for cement output shown in table . Hence estimates of p_1/p_2 in 1973, 1974, 1975 and 1976 can be derived. Let $\bar{p}$ be the average of these price ratios and assume that the true price ratio is approximately constant through time. Then $\bar{p}$ can be used as an approximation to p_1/p_2 in years prior to 1973. Substituting in the equation above yields

$$S_1 \doteqdot \bar{p} \cdot \frac{q_1}{q_2} S_2.$$

Now $\bar{p}$ is known, S_2 is known (Aberthaw's turnover from cement in the UK) and q_1/q_2 can be estimated from the market share data in table for any year before 1973. Hence estimates of S_1 can be obtained for the earlier years.

Ketton

Figures for total sales are available from the accounts up to 1971 and these have been assumed to represent proceeds from UK cement deliveries (the company is not diversified and does not export). For the period after 1971 estimates of cement turnover have been derived in a similar fashion to those for APCM, except that the price ratio has been estimated on the basis of the observations for 1968-71. Aberthaw's cement was again taken to be the numeraire.

Ribblesdale

In the absence of any published information on Ribblesdale's turnover,

it has been assumed that the ratio of the average price of its cements to the average price of Aberthaw's cements was constant through time and equal to the estimated price ratio derived for Ketton in 1968-71 (Ketton and Ribblesdale are of similar size, are linked through ownership and both operate on single sites in the North of England). The method of estimation used for APCM then yields the required turnover series.

Rugby

The annual reports provide figures for turnover from sales of cement and lime produced in the UK since 1971. Since both lime sales and exports appear to be relatively small in magnitude the turnover figures are used to approximate sales revenue from cement in the UK. Prior to 1970 the required estimates are again generated by the method used in the APCM case.

Tunnel

Since no figures for cement sales are available in the annual reports, it has been assumed that the relative (average) price of Tunnel's cements (with Aberthaw as numeraire) is constant and equal to the estimated price ratio derived for Rugby from the 1971-76 data. Rugby's relative price is chosen because it is a company of similar size. Application of the method used in previous cases then yields the estimated turnover series.

Throughout the appendix data which is not on a calendar year basis has been adjusted to render it comparable with other information. For example, Tunnel's accounting year ends in late March, so the figure for turnover in (say) 1973 shown in the tables will have been calculated by taking the sum of one-quarter of turnover in the accounting year 72/73 and three-quarters of turnover in the accounting year 73/74. Similar procedures have been applied to capital employed figures and the table in this case shows capital employed at the end of each calendar year.

Table 77 Turnover (£m)

	1968	1969	1970	1971	1972
APCM	136.6	145.3	145.4	170.7	174.7
T.W. Ward	59.3	65.4	73.2	84.2	108.7
Tunnel	18.8*	18.7*	22.4*	26.8	29.9
Rugby	26.4	31.7	37.8	43.9	46.0
Aberthaw	3.8	4.0	5.0	6.5	8.5

	1973	1974	1975	1976
APCM	209.0	213.3	286.1	360.0
T.W. Ward	134.4	169.0	211.1	232.8
Tunnel	34.2	41.9	48.5	52.2
Rugby	57.8	65.2	71.6	77.6
Aberthaw	9.4	9.8	13.0	15.2

Note on Tunnel data

Prior to the accounting year 1970/71 the share of associated companies was not consolidated into turnover (whereas capital, profit, etc.) was consolidated, leading to non-comparabilities in the data. To partially compensate for this, an estimate of half the sales of Ribblesdale (attributable to Tunnel) has been added back to the turnover data shown in the accounts for the years 1968-70. The figures in the table for these years are therefore estimates only, but comparisons with later years suggest that the errors involved are relatively small.

Table 78 Capital Employed (£m)

	1968	1969	1970	1971	1972
APCM	173.8	212.6	227.5	233.1	246.7
T.W. Ward	34.6	37.8	40.6	43.6	49.6
Tunnel	24.0	24.3	26.0	29.9	33.1
Rugby	49.7	52.6	55.4	57.7	64.2
Aberthaw	3.4	3.5	3.8	4.5	5.6

	1973	1974	1975	1976
APCM	271.4	361.8	408.1	483.5
T.W. Ward	62.5	86.8	91.0	95.4
Tunnel	34.5	36.1	37.3	40.4
Rugby	73.7	74.1	81.2	90.4
Aberthaw	7.8	9.8	11.2	12.4

Table 79 Number of Employees in U.K.

	1968	1969	1970	1971	1972
APCM	14382	14413	13551	13304	13072
T.W. Ward	10985	10761	10817	10930	11069
Tunnel	2351	2423	2518	2490	2429
Rugby	3303	3351	3347	3388	3405
Aberthaw	560	561	572	611	735

	1973	1974	1975	1976
APCM	13053	13110	12597	12228
T.W. Ward	11069	10724	10218	9256
Tunnel	2386	2267	2167	1878
Rugby	3402	3328	3175	3135
Aberthaw	761	753	756	812

Table 80 Wages and Salaries in UK (£m)

	1968	1969	1970	1971	1972
APCM	18.98	20.11	21.52	24.21	27.29
T.W. Ward	10.99	11.70	12.90	14.53	16.09
Tunnel	3.06	3.32	3.95	4.49	5.06
Rugby	4.46	4.79	5.27	5.84	6.51
Aberthaw	0.81	0.87	1.05	1.21	1.58

	1973	1974	1975	1976
APCM	30.34	36.16	45.19	49.32
T.W. Ward	17.48	21.02	25.22	26.09
Tunnel	5.44	6.46	7.65	7.29
Rugby	7.44	8.61	10.27	11.45
Aberthaw	1.78	2.11	2.76	3.26

Table 81 Net profit (£m)

	1968	1969	1970	1971	1972
APCM	20.99	18.73	20.84	29.61	30.71
T.W. Ward	2.96	3.19	4.25	5.44	6.91
Tunnel	2.67	2.14	1.76	2.69	4.60
Rugby	5.88	6.86	8.17	9.96	10.80
Aberthaw	0.56	0.55	0.81	1.00	1.27

	1973	1974	1975	1976
APCM	37.50	29.15	49.10	52.30
T.W. Ward	8.67	11.02	11.70	12.25
Tunnel	5.16	4.66	4.81	6.48
Rugby	11.99	11.66	12.67	14.02
Aberthaw	1.18	1.13	1.96	2.18

Table 82 Gross Cash Flow (£m)

	1968	1969	1970	1971	1972
APCM	29.78	30.78	31.66	41.01	41.84
T.W. Ward	4.30	4.57	5.75	7.06	8.68
Tunnel	3.87	3.38	3.16	4.39	6.40
Rugby	7.29	9.02	10.24	12.04	13.18
Aberthaw	0.79	0.77	1.04	1.24	1.56

	1973	1974	1975	1976
APCM	52.09	46.71	69.10	76.60
T.W. Ward	10.62	13.32	14.18	14.88
Tunnel	6.99	6.47	6.54	8.07
Rugby	15.19	14.69	16.16	18.07
Aberthaw	1.51	1.47	2.43	2.84

Table 83 Net Cash Flow (£m)

	1968	1969	1970	1971	1972
APCM	21.67	24.28	25.78	33.77	34.17
T.W. Ward	3.08	3.28	4.13	4.99	6.22
Tunnel	2.82	2.53	2.51	3.43	4.65
Rugby	6.11	7.58	8.27	9.07	9.90
Aberthaw	0.58	0.56	0.74	0.86	1.04

	1973	1974	1975	1976
APCM	38.30	35.23	46.70	54.00
T.W. Ward	7.60	9.18	9.98	10.34
Tunnel	5.00	4.26	4.28	4.99
Rugby	11.14	10.69	11.47	12.73
Aberthaw	0.95	0.90	1.15	2.00

Table 84 Estimated Turnover from Sales of Cement in the UK (£m)

Figures in parentheses show estimated UK cement turnover as a percentage of total turnover. Stars denote estimated magnitudes.

Year	Aberthaw	APCM	Ketton[a]
1968	3.8 (100)	63.0* (46)	3.6 (100)
1969	4.0 (100)	65.8* (45)	3.9 (100)
1970	5.0 (100)	71.9* (49)	4.7 (100)
1971	6.5 (100)	91.2* (53)	5.7 (100)
1972	7.5 (88)	96.3* (46)	6.4* (100)*
1973	8.1 (86)	110.8 (53)	6.1* (100)*
1974	8.1 (83)	111.3 (52)	7.7* (100)*
1975	11.3 (87)	150.8 (53)	9.7* (100)*
1976	13.2 (87)	167.7 (47)	12.7* (100)*

	Ribblesdale	Rugby	Tunnel[a]
1968	4.1* (100)	13.5* (51)*	14.1* (75)*
1969	4.8* (100)*	14.2* (45)*	14.8* (79)*
1970	5.3* (100)*	15.8* (42)*	16.4* (73)*
1971	6.9* (100)*	22.5 (51)	21.4 (80)*
1972	6.4* (100)*	23.7 (52)	21.4* (72)*
1973	7.8* (100)*	27.0 (47)	20.4* (60)*
1974	8.7* (100)*	26.9 (41)	21.7* (52)*
1975	12.1 (100)*	36.5 (51)	26.0* (54)*
1976	14.1* (100)*	42.7 (55)	30.4* (58)*

Table 84 (cont)

Year	Ketton[b]	Tunnel[b]	T.W.Ward	F.L.Schmidth
1968	5.6* (100)*	16.1* (86)*	4.1* (7)*	4.2* (n.a.)
1969	6.3* (100)*	17.2* (92)*	4.7* (7)*	4.5* (n.a.)
1970	7.3* (100)*	19.0* (85)*	5.4* (7)*	4.9* (n.a.)
1971	9.1* (100)*	24.8* (93)*	6.7* (8)*	6.4* (n.a.)
1972	9.6* (100)*	24.6* (82)*	7.1* (7)*	6.4* (n.a.)
1973	10.0* (100)*	24.3* (71)*	10.3* (8)*	4.7* (n.a.)
1974	12.0* (100)*	26.0* (62)*	18.0*(11)*	0* (0)*
1975	15.7* (100)*	32.0* (66)*	24.0*(11)*	0* (0)*
1976	19.7* (100)*	37.4* (72)*	29.4*(13)*	0* (0)*

Notes

The figures for Ketton[a] and Tunnel[a] do not include the estimated sales of their associated company, Ribblesdale.

In the columns headed Ketton[b] and Tunnel[b], the appropriate shares (50%) of Ribblesdale's estimated cement sales have been assigned to the former companies. The figures under Tunnel[b] are therefore the appropriate ones to use (in conjunction with the firm's other accounting data) when assessing the relative importance of its total cement activities.

The Ward figures are obtained by assigning the company the following fractions (based on percentages of equity owned) of other firms' sales:

Until end-June 1973 - 74% of Ketton's sales (b column)

After end-June 1973 - 100% of Ketton's sales (b column)

After end-September 1973 - 26% of Tunnel's sales (b column)

The Schmidth sales are calculated as 26% of Tunnel[b] until end-September 1973.

Appendix 2: Profit and Loss Accounts

Table 85 APCM Group Profit and Loss Account, year ended 31st December 1976

		£m
TURNOVER		360.0
	Trading profit before depreciation	55.9
less	Depreciation	24.3
	TRADING PROFIT	31.6
add	Share of profits of associates	16.9
add	Investment income	3.8
less	Finance charges	6.9
	PROFIT BEFORE TAXATION	45.4
less	Taxation	22.6
	PROFIT AFTER TAXATION	22.8
less	Interest of minority shareholders	4.4
	GROUP SHARE OF PROFIT AFTER TAXATION	18.4
	Dividends	6.8
	Retained profit	11.6
Earnings per £1 ordinary stock unit		22.8 p

Table 86 APCM Company and Group Balance Sheets 31st December 1976

	Company (£m)	Group (£m)
CAPITAL EMPLOYED		
Ordinary capital	81.0	81.0
Reserves	113.6	254.6
TOTAL ORDINARY STOCKHOLDERS FUNDS	194.6	335.6
Preference Capital	0.3	0.3
Minority interests	-	42.8
Investment incentives equalisation	24.6	30.1
Debentures and loans	62.5	74.7
Total Capital Employed	282.0	483.5
NET ASSETS EMPLOYED		
CURRENT ASSETS		
Stocks and work in progress	32.6	67.2
Debtors	43.1	68.6
Deposits	20.4	23.2
Bank balances	0.2	2.4
	96.3	161.4
CURRENT LIABILITIES		
Creditors	20.3	46.8
Bank loans and overdrafts	7.6	10.9
Taxation	16.5	21.2
Dividends	4.7	4.7
	48.5	83.6
NET CURRENT ASSETS	47.8	77.8
FIXED ASSETS	209.9	272.4
INTEREST IN SUBSIDIARIES	12.8	1.3
TRADE AND OTHER INVESTMENTS	11.5	132.0
Total	282.0	483.5

Table 87 APCM Group Source and Application of Funds, year ended 31st December 1976

	£ millions
SOURCES	
Profit before taxation	45.4
Depreciation	24.3
Profits retained in associates	-5.2
Disposal of investments	0.5
Disposal of fixed assets	4.1
New loans	11.4
TOTAL	80.5
APPLICATIONS	
Dividends paid	8.2
Tax paid	13.3
Purchase of fixed assets	14.4
Purchase of investments	13.1
Redemption of depentures and loans	3.2
Increase in stocks	4.6
Increase in debtors	8.2
Increase in creditors	0.1
Increase in net liquid funds	15.4
TOTAL	80.5

Table 88 APCM Group Financial Statement 1967 - 76 (all figures in £ million)

	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
CAPITAL EMPLOYED										
Ordinary capital	54.0	54.0	54.0	54.0	54.0	81.0	81.0	81.0	81.0	81.0
Reserves	53.1	57.6	80.2	87.7	93.9	68.9	86.6	171.3	195.6	254.6
Total ordinary stockholders' funds	107.1	111.6	134.2	141.7	147.8	149.8	167.6	252.2	276.6	335.6
Preference capital	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Debenture and loans	24.2	35.6	51.7	58.9	56.7	58.2	56.5	51.2	72.3	74.7
Minority interests	13.8	20.3	21.3	18.6	19.9	16.5	19.6	30.2	28.8	42.8
Investment incentives equalisation	4.0	6.0	5.1	8.0	8.4	21.9	27.4	27.8	30.1	30.1
Total capital employed	149.3	173.8	212.6	227.5	233.1	246.7	271.4	361.8	408.1	483.5
REPRESENTED BY										
Fixed Assets	111.5	131.2	168.6	169.8	171.8	184.7	195.1	281.4	271.9	272.4
Trade Investments	10.2	10.9	13.2	23.9	25.5	32.7	38.8	48.9	76.8	133.3
Net current assets	27.6	31.7	30.8	33.7	35.7	29.3	37.4	31.5	59.4	77.8
Total	149.3	173.8	212.6	227.5	233.1	246.7	271.4	361.8	408.1	483.5

Table 89 Rugby Portland Group Profit and Loss Account, year ended 31st December 1976

	£ thousands
TURNOVER	77,562
PROFIT BEFORE TAXATION	12,491
less Taxation	5,333
less Minority interests	202
add Extraordinary item	1,845
less Extraordinary item to capital reserve	1,845
PROFIT ATTRIBUTABLE TO THE SHAREHOLDERS	6,956
Dividends	3,053
Retentions	3,903
Earnings per 25p ordinary share	8.2 p
Earnings per 5p participating share	3.6 p

Note: The extraordinary item in the accounts represents the excess of the sale proceeds of Trinidad Cement Limited over the consolidated assets at the date of sale, 31 July 1976.

Table 89 (continued) APCM Group Financial Statement 1967 - 1976

	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
TURNOVER										
Home Companies	84.9	89.8	89.3	99.9	119.8	129.6	150.5	153.1	202.9	239.6
Overseas Companies	37.6	46.8	56.0	45.6	50.9	45.1	58.4	60.2	83.2	120.4
Total	122.5	136.6	145.3	145.4	170.7	174.7	208.9	213.3	286.1	360.0
PROFITS, DIVIDENDS AND RETENTIONS										
Depreciation	8.8	9.3	12.2	11.1	12.4	12.7	15.0	17.6	20.0	24.3
Trading profit after depreciation	19.0	18.7	15.8	16.8	23.8	23.4	28.6	18.0	31.5	31.6
Profit before taxation	18.9	18.3	15.4	15.9	23.0	23.7	31.8	22.5	42.5	45.4
Taxation	7.7	8.1	6.9	5.9	7.2	7.7	13.8	11.5	22.4	22.6
Profit after taxation	11.2	10.2	8.4	10.0	15.7	16.0	18.0	11.0	20.1	22.8
Group share of profit after taxation	10.3	8.8	6.5	8.7	13.6	14.1	15.5	8.2	16.6	18.4
Ordinary dividends	6.1	6.1	4.6	6.2	7.6	6.3	5.7	5.7	6.2	6.8
Retained profit	4.1	2.7	1.9	2.5	6.0	7.8	9.8	2.5	10.4	11.6

Note: In 1976 a Rhodesian subsidiary company, the Salisbury Portland Cement Company Limited, ceased to be consolidated because of the political situation in that country. In 1975 SPCC appears to have contributed £6.2m to turnover.

Table 90 Rugby Portland Company and Group Balance Sheets, 31st December 1976

	£ thousands	
	Company	Group
CAPITAL EMPLOYED		
Share Capital	19220	19220
Reserves	19928	48999
Future taxation	4590	7025
Loan stock	12500	12500
Minority interests, etc.	-	2662
Total capital employed	56238	90406
NET ASSETS EMPLOYED		
CURRENT ASSETS		
Stocks	7650	17094
Debtors	6556	13078
Bank balances	7144	25953
Total	21350	56125
CURRENT LIABILITIES		
Creditors	8860	18891
Dividends	3053	3053
Bank overdrafts	2514	6101
Total	14427	28135
NET CURRENT ASSETS	6923	27990
FIXED ASSETS	24821	59712
SUBSIDIARY COMPANIES	24347	-
INVESTMENTS	147	2704
Total	56238	90406

Table 91 Rugby Portland Group Source and Application of Funds, year ended 31st December 1976

	£ thousands
SOURCES	
Profit after taxation and minority interests	6956
Depreciation	4052
Future taxation	2540
Minority interests	87
Sale proceeds of subsidiary	4400
Currency changes	1265
Investments	90
Total	19390
APPLICATIONS	
Fixed assets	6684
Dividends paid	2776
Secured loan repayment	41
Increase in stocks	5216
Increase in debtors	2746
Increase in creditors	-1601
Increase in bank balances	3528
Total	19390

Table 92 Rugby Portland Group Financial Statement 1967 - 76 (all figures in £ million)

	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
CAPITAL EMPLOYED										
Share and loan capital	14.4	27.5	26.9	26.8	29.0	29.0	32.5	32.5	32.5	32.2
Reserves	16.7	20.4	23.4	25.8	26.1	32.2	35.7	36.9	42.0	49.0
Future taxation	0.6	1.0	1.4	1.8	1.5	1.6	3.0	3.1	4.9	7.0
Minority interests	0.7	0.7	0.9	1.0	1.1	1.4	2.1	2.0	2.1	2.2
Inter-group balance	-0.3	-	-	-	-	-	-	-	-	-
Total capital employed	32.1	49.7	52.6	55.4	57.7	64.2	73.2	74.1	81.2	90.4
REPRESENTED BY										
Fixed assets	25.9	35.0	35.2	37.7	40.6	49.0	54.5	55.8	59.6	59.7
Net current assets	6.1	14.7	17.4	17.7	17.1	15.2	18.7	18.4	21.5	30.7
Total	32.1	49.7	52.6	55.4	57.7	64.2	73.2	74.1	81.2	90.4

Table 92 (continued) Rugby Portland Group Financial Statement 1967 - 76

	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
TURNOVER	19.0	26.4	31.7	37.8	43.9	46.0	57.8	65.2	71.6	77.6
PROFITS, DIVIDENDS AND RETENTIONS										
Profit before taxation	4.6	5.2	5.9	7.1	9.0	9.9	10.9	10.5	11.3	12.5
Taxation	1.1	1.2	1.4	2.0	3.0	3.3	4.1	4.0	4.7	5.3
Minority interests	0.2	0.1	0.2	0.2	0.2	0.3	0.3	0.2	0.1	0.2
Profit after taxation and minority interests	3.3	3.8	4.3	4.9	5.8	6.4	6.6	6.3	6.5	7.0
Dividends	1.6	1.8	2.2	2.4	3.2	2.7	2.4	2.6	2.8	3.1
Retentions	1.7	2.0	2.0	2.5	2.6	3.7	4.2	3.7	3.7	3.9

Table 93 Tunnel Holdings Group Profit and Loss Account, year ended 27th March 1977

	£ thousands
TURNOVER	
Group turnover, excluding intra-group sales	33583
Share of associated companies	19408
TRADING PROFIT	2870
add Share of profits of associated companies	2295
add Other investment income	206
add Interest receivable less payable	1006
less Debenture interest payable	129
add Exceptional items	225
PROFIT BEFORE TAXATION	6473
less Taxation	3095
PROFIT AFTER TAXATION	3378
add Minority interests	6
add Extraordinary items	274
PROFIT ATTRIBUTABLE TO THE SHAREHOLDERS	3658
Dividends	1187
Retentions	2471
Earnings per 50p equity unit	28.5p

NOTES The exceptional items resulted from profit on the purchase for cancellation of 5¾% debenture stock (£7000) and from the surplus on the sale of a subsidiary's business (£218000).

The extraordinary items were realised profits on the sales of investments.

Table 94 Tunnel Holdings Parent Company and Group Balance Sheets, 27th March 1977

	£ thousands	
	Company	Group
CAPITAL EMPLOYED		
Ordinary shares and stock	5870	5870
Reserves	20630	26205
Preference Capital	1200	1200
Debentures	2249	2249
Deferred taxation	17	5476
Minority interests	-	298
Total capital employed	29966	41298
NET ASSETS EMPLOYED		
CURRENT ASSETS		
Bank balances and cash	5	409
Short-term deposits	6400	9540
Debtors	806	7995
Stocks, machinery spares, etc.	-	8013
Total	7211	25957
CURRENT LIABILITIES		
Bank overdrafts and advances	30	466
Creditors	1531	6715
Taxation	591	1518
Dividends	810	810
Total	2962	9489
NET CURRENT ASSETS	4249	16468
ASSETS HELD FOR DISPOSAL	-	693
FIXED ASSETS	2346	17451
INVESTMENTS	854	6686
INTEREST IN SUBSIDIARIES	22517	-
Total	29966	41298

Table 95 Tunnel Holdings Group Source and Application of Funds, Year ending 27th March 1977

	£ thousands
SOURCES	
Profit before tax and extraordinary items	6473
Extraordinary items	307
Depreciation	1589
Retained in associated companies	-1686
Minority interests on acquisition of subsidiary	173
Reserves on acquisition of subsidiary	253
Sale of fixed assets and assets held for disposal	870
Total	7979
APPLICATIONS	
Dividends paid to shareholders	1117
Dividends paid to minority interests	6
Taxation	331
Purchase of investments	960
Purchase of fixed assets	1592
Purchase of debentures for cancellation	13
Increase in stocks	-508
Increase in debtors	-117
Increase in creditors	3877
Increase in liquid funds	708
Total	7979

Table 96 Tunnel Holdings Groups Financial Statement 1967-77 (all Figures in £ millions)

	1967/8	1968/9	1969/70	1970/71	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77
CAPITAL EMPLOYED										
Equity interests	18.0	18.2	18.2	20.5	23.7	26.9	27.6	28.6	29.4	32.1
Preference capital	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Minority interests	0.1	-	-	-	-	-	-	-	0.1	0.2
Debentures	3.0	2.9	2.8	2.8	2.7	2.6	2.5	2.4	2.3	2.2
Deferred taxation	1.6	1.8	2.1	2.2	3.4	3.1	3.4	4.3	4.5	5.5
Total capital employed	24.0	24.0	24.4	26.6	31.0	33.8	34.7	36.5	37.5	41.3
REPRESENTED BY										
Fixed assets	16.5	19.7	21.0	20.5	21.4	20.4	20.3	19.0	19.0	18.1
Investments	2.7	2.7	2.7	3.5	2.6	4.1	6.6	6.6	5.0	6.7
Net current assets	4.8	1.6	0.7	2.6	7.0	9.3	7.8	10.8	13.5	16.5
Total	24.0	24.0	24.4	26.6	31.0	33.8	34.7	36.5	37.5	41.3

Table 96 (continued) Tunnel Holdings Group Financial Statement 1967 - 77

	1967/8	1968/9	1969/70	1970/1	1971/2	1972/3	1973/4	1974/5	1975/6	1976/7
TURNOVER										
Group turnover	17.1	16.8	16.6	19.4	23.5	24.1	23.5	26.3	32.3	33.6
Share of associated companies	-	-	-	3.7	4.5	6.5	11.8	17.8	17.6	19.4
PROFIT, DIVIDENDS and RETENTIONS										
Depreciation	1.2	1.2	1.3	1.7	1.8	1.8	1.8	1.8	1.7	1.6
Trading profit	2.1	1.7	0.8	1.1	2.8	3.9	2.9	2.5	4.2	3.7
Profit before taxation	2.6	2.1	1.5	2.3	4.2	5.0	4.6	4.1	6.3	6.5
Taxation	1.1	0.9	0.6	0.9	1.7	1.9	2.3	2.0	3.0	3.1
Profit after taxation	1.5	1.2	0.8	1.4	2.4	3.2	2.3	2.1	3.3	3.4
Profit attributable to equity	1.5	1.2	0.8	1.3	2.4	3.1	2.3	2.1	3.2	3.3
Ordinary dividends	1.2	1.0	0.7	0.9	1.2	1.0	0.9	1.0	1.0	1.1
Retentions	0.4	0.2	0.1	0.6	1.6	2.2	0.4	1.0	0.9	2.5

Table 97 Aberthaw Cement Group Profit and Loss Account, year ended 31st December 1976

	£ thousands
TURNOVER	15239
PROFIT BEFORE TAXATION	1677
less Taxation	839
PROFIT ATTRIBUTABLE TO SHAREHOLDERS	838
Dividends	248
Retentions	590
Earnings per 25 p ordinary share	21.23p

Table 98 Aberthaw Cement Company and Group (consolidated)
Balance Sheets, 31st December 1976

	£ thousands	
	Company	Group(consolidated)
CAPITAL EMPLOYED		
Issued capital	1221	1221
Reserves	4147	4226
Loans	2750	2750
Deferred grants	709	709
Deferred taxation	3388	3524
Total capital employed	12215	12430
NET ASSETS EMPLOYED		
CURRENT ASSETS		
Stocks	2757	3244
Debtors and prepayments	1747	2162
Regional development grant	25	25
Investments	-	13
Cash and bank balances	2	11
Total	4531	5455
CURRENT LIABILITIES		
Creditors and accrued charges	1587	1776
Taxation	137	158
Bank overdrafts	736	985
Acceptance credit	100	100
Dividend on preference stock	6	6
Proposed dividend on ordinary shares	235	235
Total	2801	3260
NET CURRENT ASSETS	1730	2195
FIXED ASSETS AT NET BOOK VALUE	9778	9969
INVESTMENT IN SUBSIDIARIES	707	-
EXCESS OF COST OF SHARES IN SUBSIDIARIES OVER BOOK VALUE OF NET ASSETS ACQUIRED	-	266
Total	12215	12430

Table 99 Aberthaw Cement Group Source and Application of Funds, year ended 31st December 1976

	£ thousands
SOURCES	
Profit before taxation	1677
Depreciation less grants released	566
Sale of fixed assets	22
Grants received	191
Total	2446
APPLICATIONS	
Purchase of fixed assets	747
Dividends paid	227
Taxation	118
Costs relating to the acquisition of a subsidiary	19
Repayment of loan	50
Increase in stocks	800
Increase in debtors	284
Increase in creditors	-67
Increase in investments	13
Net decrease in short term borrowings	255
Total	2446

Table 100 Aberthaw Cement Financial Statement 1967-76 (all figures in £ thousands)

	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
CAPITAL EMPLOYED										
Share capital and reserves	2407	2432	2460	2707	3017	3928	4232	4356	4857	5447
Loans	-	-	-	-	250	300	1300	2800	2800	2750
Deferred grants	316	330	347	352	352	313	333	470	698	709
Deferred taxation	508	615	670	763	885	1097	1899	2207	2830	3524
Total capital employed	3231	3377	2477	3822	4504	5638	7764	9833	11185	12430
REPRESENTED BY										
Fixed assets	3922	3771	3801	3708	3872	4996	7351	8840	9904	9969
Net current assets	-691	-394	-324	114	632	399	173	752	1040	2195
Goodwill	-	-	-	-	-	243	240	241	241	266
Total	3231	3377	3477	3822	4504	5638	7764	9833	11185	12430

Table 100 (continued) Aberthaw Cement Financial Statement 1967 - 76

	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
TURNOVER	3768	3826	3995	4997	6508	8502	9412	9786	13049	15239
PROFITS, DIVIDENDS and RETENTIONS										
Depreciations	260	230	225	228	239	292	336	351	477	663
Profit before taxation	410	481	473	744	953	1223	1149	1085	1642	1677
Taxation	173	207	212	300	379	518	566	564	836	839
Profit after taxation	237	274	261	444	574	705	583	521	806	838
Extraordinary items	-	-	-	-	-	-	72	189	78	-
Dividends	234	128	115	281	295	230	207	207	227	248
Retentions	3	25	12	178	279	475	304	125	501	590

NOTES

From 1972 onwards the figures are drawn from the consolidated accounts. Prior to 1972 consolidated accounts for the company are not available.

The figures for extraordinary items are dominated by interest, less taxation relief on a bank loan obtained for the purpose of financing a new kiln during its construction period.

European Communities – Commission

Evolution of concentration in the United Kingdom cement industry: structure, conduct and performance

This report, commissioned by the Directorate-General for Competition of the European Communities, has been written and prepared by Charles K. Rowley and George K. Yarrow with collaboration of Graham Bannock

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In 1970 the Commission initiated a research programme on the evolution of concentration and competition in several sectors and markets of manufacturing industries in the different Member States (textile, paper, pharmaceutical and photographic products, cycles and motorcycles, agricultural machinery, office machinery, textile machinery, civil engineering equipment, hoisting and handling equipment, electronic and audio equipment, radio and television receivers, domestic electrical appliances, food and drink manufacturing industries).

The aims, criteria and principal results of this research are set out in the document "Methodology of concentration analysis applied to the study of industries and markets", by Dr. Remo LINDA, (ref. 8756 – English version), September 1976.

This particular volume has as its subject the evolution of concentration and competition in the cement industry for the United Kingdom.

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